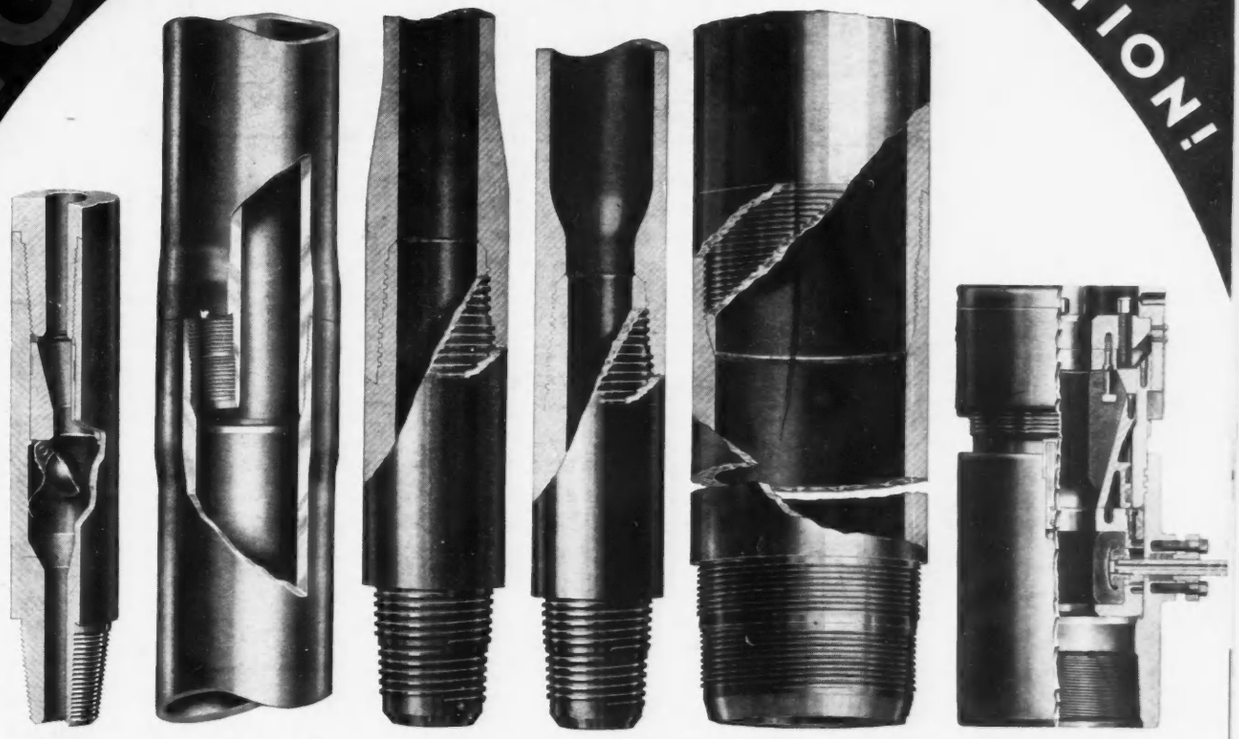
15c

The OIL WEEKLY

FOR OIL AND GAS PRODUCERS AND PIPE LINE MEN

THE WEEK'S NEWS INTERPRETED

In the SPOTLIGHT AT THE TULSA EXPOSITION!



DRILL PIPE FLOAT
Provides unrestricted fluid passage. Flapper valve and seat lift out by hand. Maximum resistance to abrasion.

EXTERNAL UPSET CASING JOINT
Made with any desired joint efficiency for all purposes requiring extreme strength in the joint. Unsurpassed as drill casing for heaving shale drilling.

INTERNAL FLUSH DRILL PIPE JOINT
This non-creeping joint is gas and fluid tight under all pressures. It provides the maximum circulation area obtainable in all sizes.

EXTERNAL FLUSH DRILL PIPE JOINT
The double-purpose drill pipe joint. Indispensable for pressure drilling — serves equally as well for regular work.

INTERNAL AND EXTERNAL FLUSH CASING JOINT
Is run through set packers easily and with maximum safety. Permits use of larger size casing in holes with diminished clearance.

COMBINATION DRILLING PACKER
Closes around the pipe **in the direction of flow.** Automatically maintains continuous seal around external flush drill pipe while running in, drilling and coming out of hole.

ALL EQUIPMENT SHOWN HEREIN IS PATENTED

You'll see this **HYDRIL** *Equipment Everywhere!*

HYDRIL COMPANY

714 W. Olympic Blvd., Los Angeles • 4300 Calhoun Rd., Houston • Cable Address "HYDRIL"

HYDRIL

VOLUME 91 MAY 18, 1936 NUMBER 10

AT THE EXPOSITION

THE WIRE ROPE INDUSTRY IN MINIATURE

Union Wire Rope Corporation extends you a cordial invitation to stop at our Exposition Exhibit, during the show—and get acquainted.

We think you will be interested in seeing our exhibit, depicting the wire rope industry in miniature. The entire operation of the exhibit is automatic, the two trains contacting switches and stops to control their own movements and all loading and unloading operations, through semaphores, switches, gates, etc.

Rods are picked up at the steel plant and delivered to the wire rope plant, and the finished reels of rope are then delivered to the logging, mining and oil industries.

The exhibit was conceived and built by our own mechanical staff at our Kansas City plant.

Don't Fail to Visit Us at
Booths 80 and 130, Texas Building

A Picture Trip
thru the Union Plant—
Ask for a Copy

UNION WIRE ROPE CORPORATION

Executive and Sales Offices: 601 Beacon Life Bldg., Tulsa, Okla.
Factory and General Office: Kansas City, Mo. Branch: Portland, Ore. Warehouse: Monahans, Texas

In Mexico:
E. O. CHAPA,
P. O. Box 604,
Tampico, Tamps.
Mexico. Stocks
at Tampico

JARECKI MFG. CO.
Distributors: Midcontinent, New Mexico and Eastern Oil Fields

MARION MACHINE FOUNDRY & SUPPLY CO.,
Rocky Mountain Fields, except New Mexico

Export Agents:
(except Mexico)
LUCEY EXPORT CORP.,
Woolworth Bldg.,
New York; Broad St.
House London

UNION WIRE LINES

◆ The "ULTIMATE LOW COST WIRE ROPE" ◆

DOWN more than ½ Mile in 49 Hours with HAYSTELLITE

This 9-7/8-in. fishtail bit—hard-set with Haystellite and hard-faced with Composite Rod—made 3050 feet of out-to-gauge hole in 49 hours in the Tomball, Texas field.

● Bits that are hard set with Haystellite Inserts and hard-faced with Haystellite Composite Rod consistently drill the greatest footage of out-to-gauge hole that can be obtained with commercial materials. This is the reason why Haystellite products are used consistently by drillers all over the world.

● Haystellite Inserts and Haystellite Composite Rod are always uniform and dependable. Care and skill in manufacture guarantee their superior performance.

Haystellite Inserts and Haystellite Composite Rod are fully described in the booklet "Haynes Stellite Products in the Oil Fields," which also tells how to apply them to best advantage. Write for your copy today.

PRODUCT OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

HAYSTELLITE TRADE MARK

The cast Tungsten Carbide diamond substitute

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

Chicago · Cleveland · Detroit · Houston · Los Angeles · New York · San Francisco · Tulsa

General Office and Works—Kokomo, Indiana

Foreign Sales Department—New York City

Haynes Stellite Welding Rods and information on other Haynes Stellite Products also are available through the 42 apparatus shipping points of The Linde Air Products Company

TUBING . . . .

DOUBLE STRENGTH STEELS . . . .

LINE PIPE UP TO 16-INCH O. D . . . .

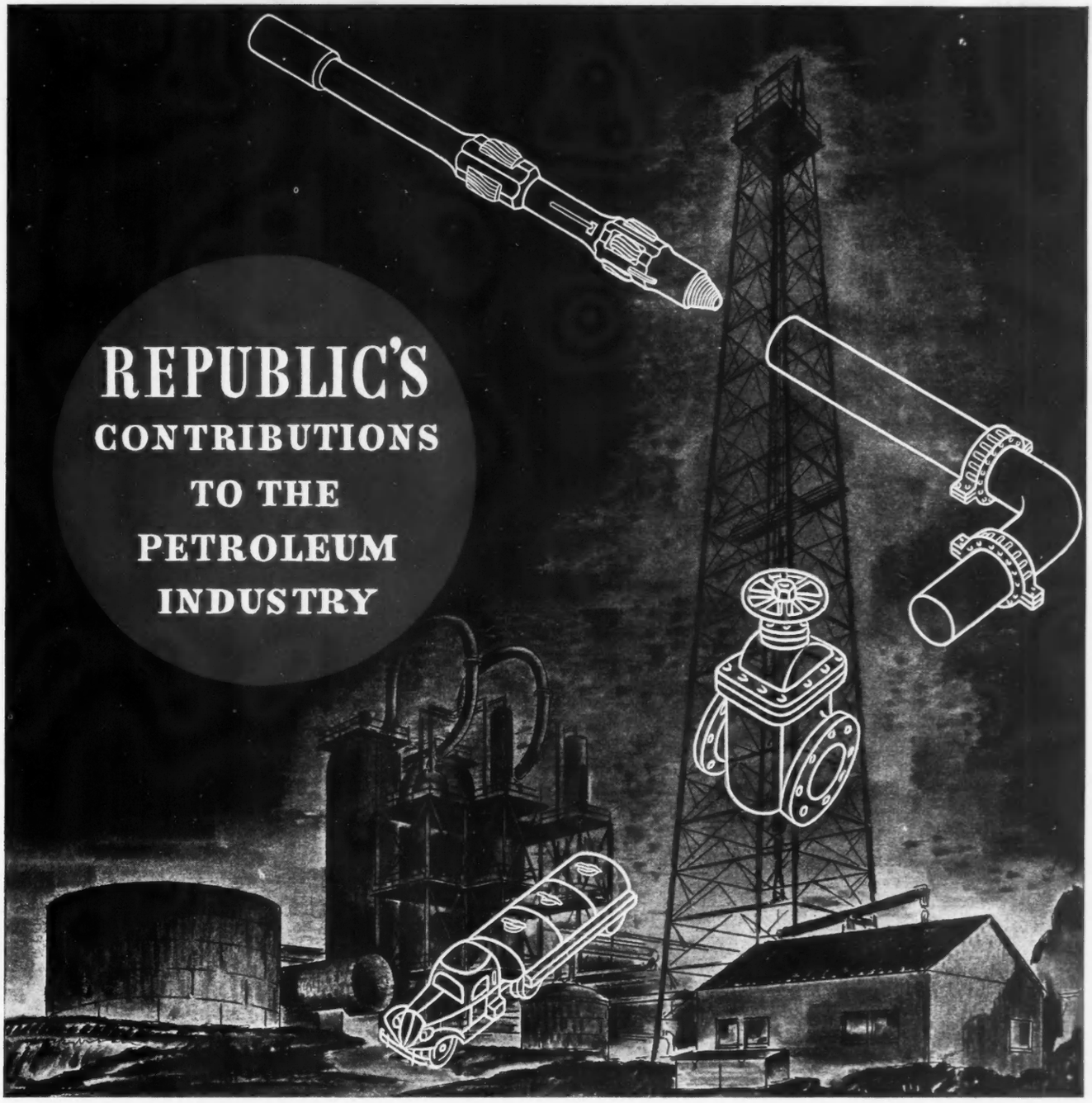
TIME-TESTED ALLOY STEELS . . . .

RUST-RESISTING TONCAN IRON . . . .

HIGH YIELD POINT, HIGH DUCTILITY CASING . .

ENDURO STAINLESS AND HEAT-RESISTING STEELS .

BOLTS, NUTS, RIVETS . . .



• Republic invites you to view the results of its efforts over a long period of years—years of research, of pioneering, of performance. Visit Booths 16 to 21 at The World's Fair of the Oil Industry, Tulsa, May 16-23. Republic men will be there to give you new ideas—to tell you how Republic's newest products will add years of life to equipment, reduce replacement costs, cut operating costs. A visit to our exhibit will pay big dividends on the cost of your trip. So, welcome, until we have the opportunity to shake your hand in Tulsa.

Republic Steel
CORPORATION
GENERAL OFFICES · · CLEVELAND, OHIO
ALLOY STEEL DIVISION · · MASSILLON, OHIO

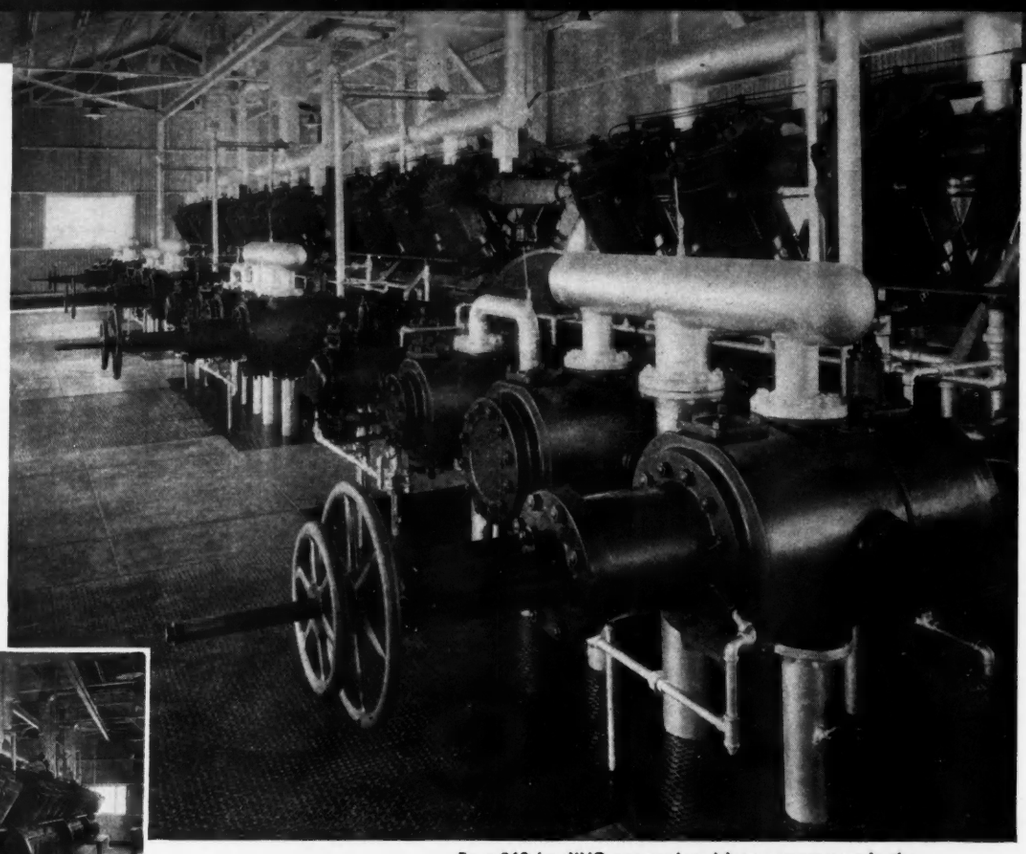
REPUBLIC
STEEL

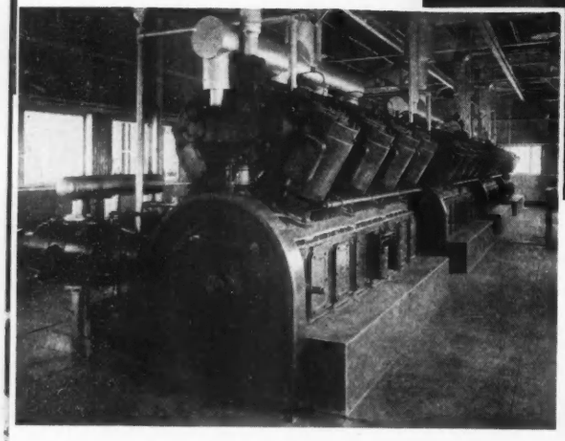
FIRST CHOICE IN THE OIL FIELDS

Ingersoll-Rand

X V G

Gas-Engine-Driven Compressors





Four 260 hp. XVG gas-engine-driven compressors in the Ventura fields, California.

Because

1. Installation costs are lower.

The XVG requires smaller foundations and less building space; units are shipped completely assembled simplifying installation.

2. Maintenance costs are lower.

All working parts are easily accessible, and small power cylinders eliminate costly engine trouble.

3. Operating economy is high.

Small power cylinders operate at more efficient temperatures and built-in recirculating water pumps maintain most efficient temperatures.

4. Maximum plant flexibility is obtained.

Four sizes 60, 125, 190 and 260 hp., allow any power combination. 95% of parts are interchangeable among various sizes.

5. Cost of moving to other sites is low.

Complete unit can be hauled to a new location and placed on new foundation.

See our exhibit at the Tulsa Petroleum Exposition May 16 to 23.

LET OUR ENGINEERS GIVE YOU COMPLETE DETAILS ON THESE UNITS

Ingersoll-Rand

11 BROADWAY, NEW YORK, N. Y.

399-1

NOW—A Special Low-Pressure Burner

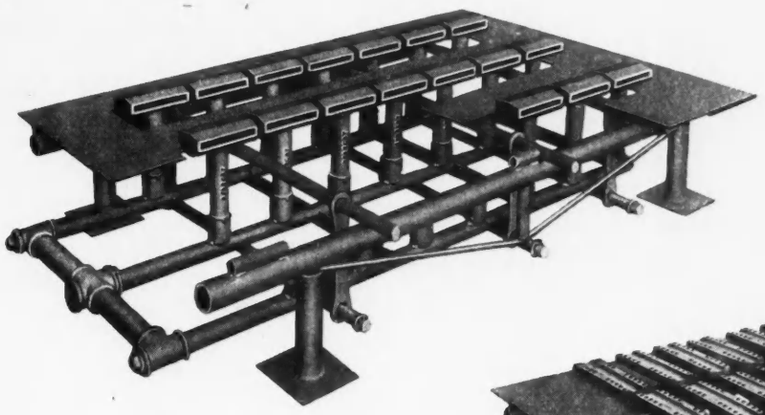
To Meet Today's Firing Demands

Comes to You from VOLCANO

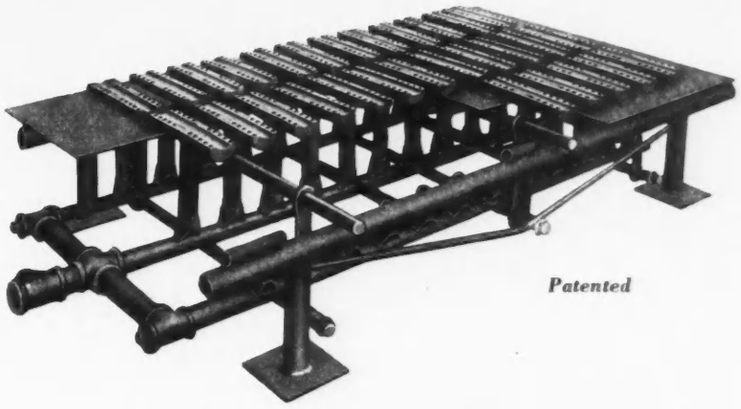
Patent Pending

Close-up view of Gulf State head and mixer, which doubles gas burner efficiency.

The Gulf State Special . . . **thoroughly proven and already the biggest seller in the field, is especially designed to meet the firing demands of the latest model, high-pressure oil field boilers, particularly of boilers with dry bottoms and larger and longer fire boxes.**



Volcano Burner products are all-steel, indestructible, non-adjustable, and will last for years. Average replacements amount to less than 1%. You install them in 30 minutes.



Patented

The Bearcat **is the new low-priced Ever-Ready, Fool-proof Burner, all-steel for rough and ready service.**

The Volcano Standard . . **proven best by seven years' tests in thousands of oil field rotary boilers.**

Fully descriptive literature on all types of Volcano Burners is available for the asking. P. O. Box 2305, Houston, Texas.

ALL-STEEL VOLCANO PRODUCTS

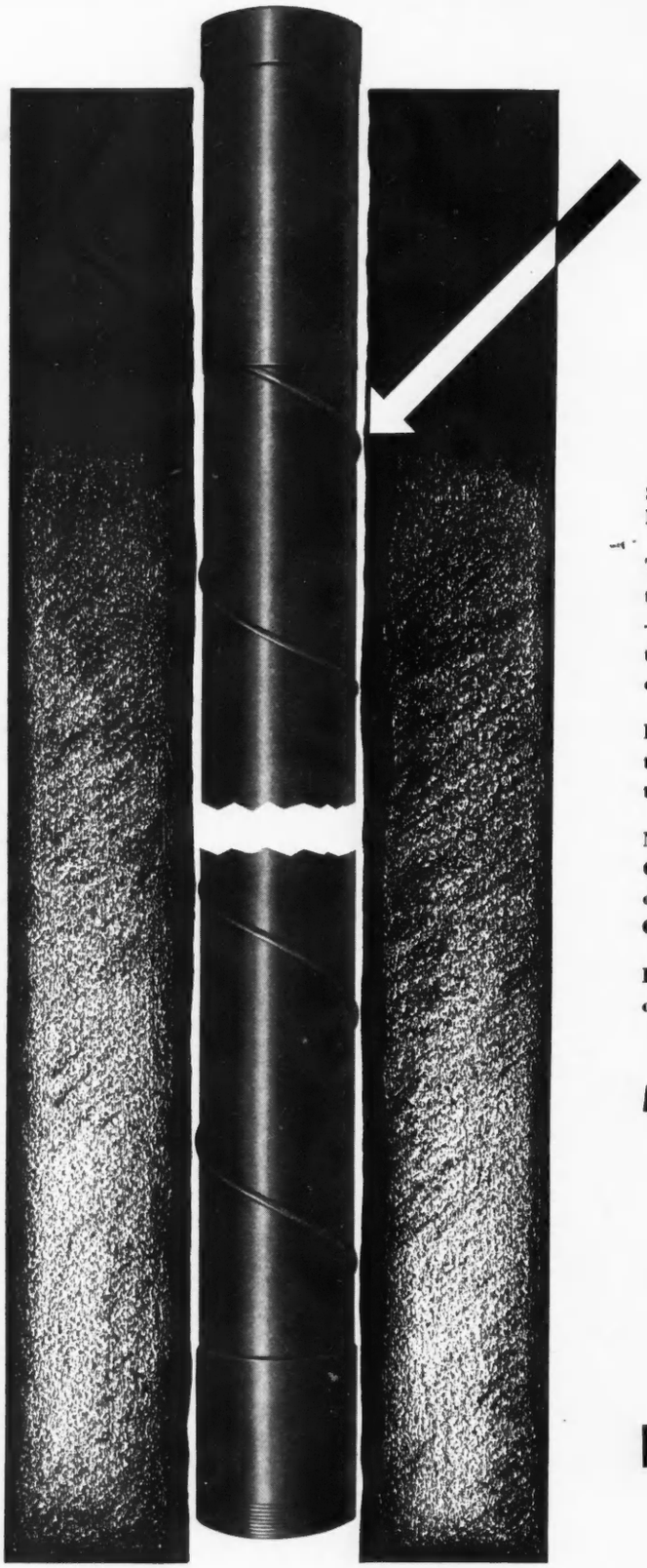
Volcano Burner Company

ROY S. DODD, *Manufacturer*

HOUSTON, TEXAS
Phone Preston 7507

TULSA, OKLA.
Phone 2-7472

NAYLOR SURFACE CASING



IT'S THE *EXCLUSIVE*
SPIRAL LOCK-SEAM WELDED STRUCTURE
THAT CENTRALIZES
NAYLOR CASING
IN THE HOLE

Structural as well as economical advantages distinguish Naylor Surface Casing from all other surface casing.

Take, for example, the decided advantage offered by the exclusive Naylor Spiral Lock-Seam Welded Structure —It is the distinctive Spiral Lock-Seam on the outside that provides a "breathing space" and helps to prevent channeling, thus insuring a *better* cementing job.

Light weight, uniform lengths, with ends accurately threaded to A.P.I. Standards simplify handling and setting as no joint welding is required.

Naylor Casing is interchangeable with A.P.I. Standard Casing and comes in uniform lengths of 30 feet, or as otherwise specified, and in Standard diameters of 13⅜" O.D., 16" O.D., 18⅝" O.D., 20" O.D. and 21½" O.D.

For descriptive bulletin and prices, call our distributors or any jobber of oil field equipment.

EXCLUSIVE DISTRIBUTORS

Mid-Continent Supply Company

Fort Worth, Texas, and Branches

PRODUCT OF NAYLORPIPE TRADE MARK

NAYLOR PIPE COMPANY

1230 EAST NINETY-SECOND STREET

CHICAGO, ILLINOIS

Pacific

MO-LOY metal

Plus

MASTER WORKMANSHIP

made

"OIL STATES"

INSERT LINER TYPE

PUMP POSSIBLE

The Benefits of MO-LOY Metal

Practically Frictionless Metal Allowing Closer Tolerance between plunger and liner which tends to shut out sand and grit; eliminates gaulding and sticking. Double Shock Strength. Super Wear Resistence. Non-Corrosive. No Lubrication required so no damage done if well pumps off.

The Advantages of "OIL STATES" Pump

Only 2 Liners—24" Seal. High Efficiency. Metal to Metal Pump. No Cups—No Packing. Minimum Rod Strain. No Tubing to Pull. Simplicity of Design. Only 15 parts.

Manufactured by Pacific Pump Company,
5716 Bicket Street, Huntington Park, Calif.

Write for "Oil States" Bulletin

MID-CONTINENT PUMP SUPPLY COMPANY

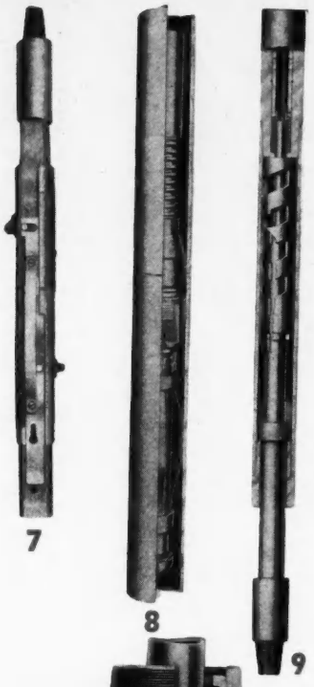
915 East 2nd Street, Tulsa, Oklahoma

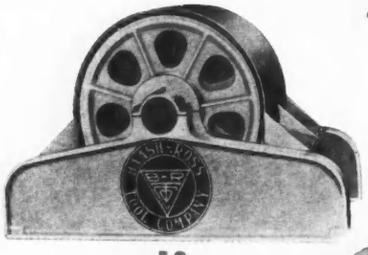
Bovaird Supply Co., Kansas — Mid-Continent Supply Co., Texas

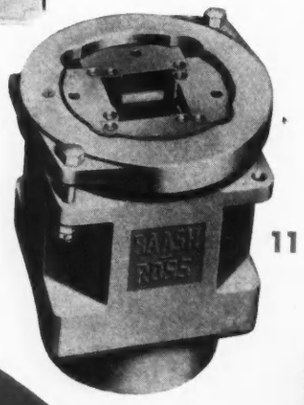
Production Supply Co., Oklahoma City

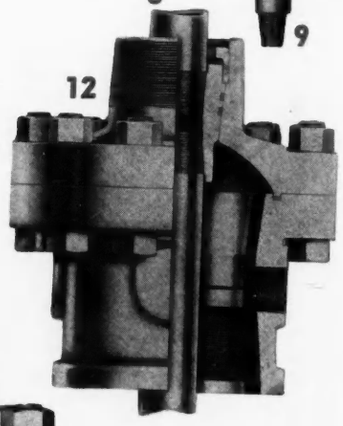
SEE THESE SAFE, MODERN *Baash-Ross* OIL TOOLS IN BOOTH 69, TEXAS BUILDING

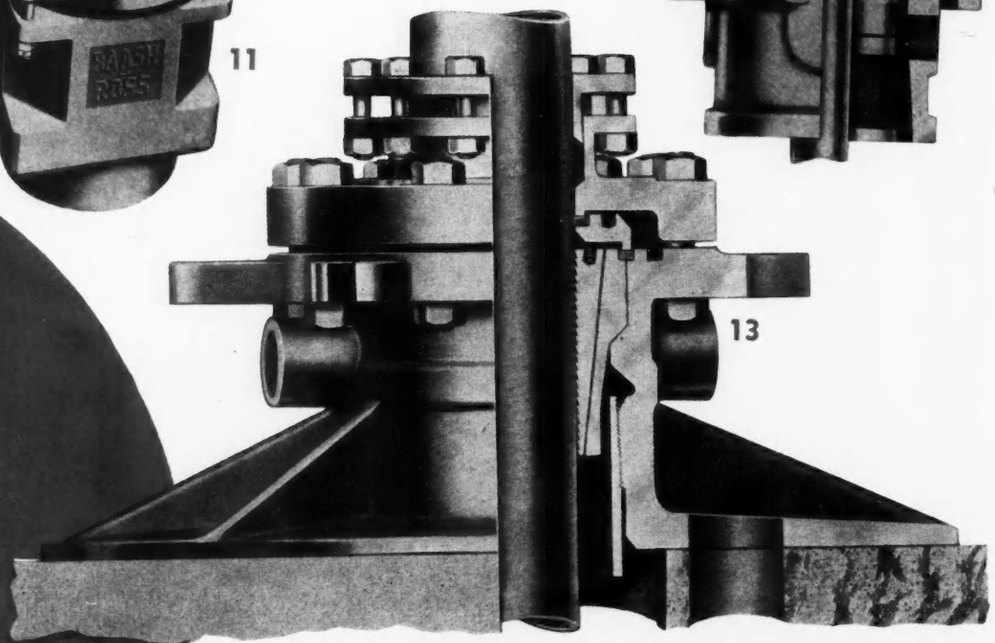
1 Releasing Socket
2 Safety Joint
3 Drill Pipe Cutter
4 Releasing Spear
5 Packing Liner Hanger
6 Long Knife Perforator
7 Star Wheel Perforator
8 Internal Casing Cutter
9 Automatic Torque Controlled Rotary Jar
10 Unitary Crown Block
11 Roller Kelly Bushing
12 Tubing Head
13 Casing Head











See the Baash-Ross section of your 1936 **COMPOSITE CATALOG** pages 115 to 166 inclusive.

ASK FOR YOUR COPY OF THIS VALUABLE REPORT

AT THE TULSA EXPOSITION

INSPECT THIS 55-FOOT BAASH-ROSS *Trubore* DRILL COLLAR

H. C. Ross, vice-president and general salesmanager, examining a 55-foot Baash-Ross drill collar.

STEP UP to this Baash-Ross drill collar in the International Nickel Company's exhibit and look through the circulation hole. You'll see why we adopted the name Trubore for our drill collars and kellys. The hole is smooth, straight as a die, and accurately centered on the true axis of the bar. Yet this 55-foot drill collar is in no way a "special job." Every Baash-Ross drill collar and kelly, short or long, is drilled by special equipment and methods exclusively our own and must pass the same rigid inspection that this one did before it is approved for delivery. A ten-foot test bar only 1/8-inch smaller in diameter than the circulation hole must pass *freely* through the bore.

And remember this: Baash-Ross drill collars and kellys are made of one-piece alloy steel forgings treated to bring out the most serviceable combination of physical properties throughout their entire length. The treatment is accurately controlled and produces these properties uniformly in every drill collar and kelly we make.

If you have not already received it, ask the Baash-Ross representative for your copy of the valuable report, "An Investigation of the Physical Properties of Alloy Steel Drill Collars and Kellys." The information it contains is authoritative, unbiased and NEW.

Study the illustrations on opposite page, then see these safe, modern oil tools in the Baash-Ross exhibit in booth 69, Texas Building.

BAASH-ROSS TOOL COMPANY

Telephone 3-4406
1559 S. E. 29th St.
OKLAHOMA CITY

Telephone Fairfax 9363
5300 Clinton Drive
HOUSTON

General Offices:
5512 Boyle Ave.
LOS ANGELES

Export Office:
30 Church St.
NEW YORK, N. Y., U. S. A.

Gulf Coast Distributors: NORVELL-WILDER SUPPLY CO.

BAASH-ROSS B·R TOOL COMPANY

HOW TO HANDLE IT

IF *IT* IS DRILLING WELLS AT LOWER COST

SEE DEEPWELL AT BOOTHS 70 and 71 TEXAS BUILDING

● The greatest chain that ever hit the oil fields, with all its 1936 improvements, is on hand at Booths 70 and 71 Texas Building, Tulsa. It is there to meet all its old friends, and to make new ones by demonstrating that it can drill oil wells at lower cost per foot of hole.

CHAIN BELT COMPANY
1639 West Bruce St., Milwaukee, Wis.

DISTRIBUTORS

MID-CONTINENT AND GULF COAST DISTRIBUTORS

Frick-Reid Supply Corporation
Lucey Products Corporation — Murray-Brooks Hardware Company, Ltd.
Norvell-Wilder Supply Company — Rex Supply Company — Coastal Supply Company
Industrial Supply Co., Inc. — Dunigan Tool and Supply Company

CALIFORNIA DISTRIBUTORS

The Republic Supply Co. of California

EXPORT

Chain Belt Company, Chrysler Building, New York
Lucey Export Corporation, Woolworth Building, New York
William E. Knight, 2-3 Norfolk St., Strand, London, W. C. 2, England

THE GREATEST CHAIN THAT EVER HIT THE OIL FIELDS

CHAIN BELT COMPANY
OF MILWAUKEE

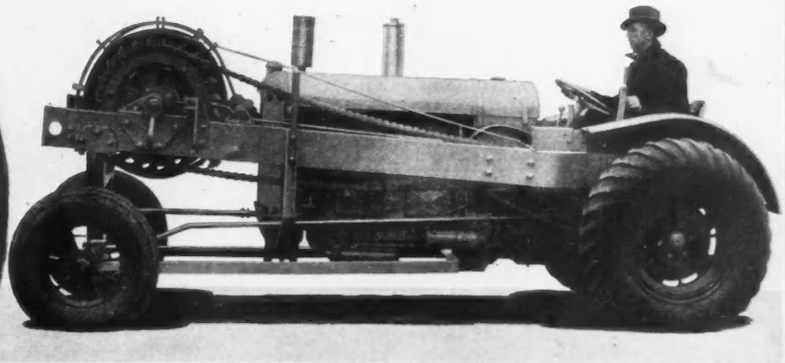
REX

Deepwell Chabelco

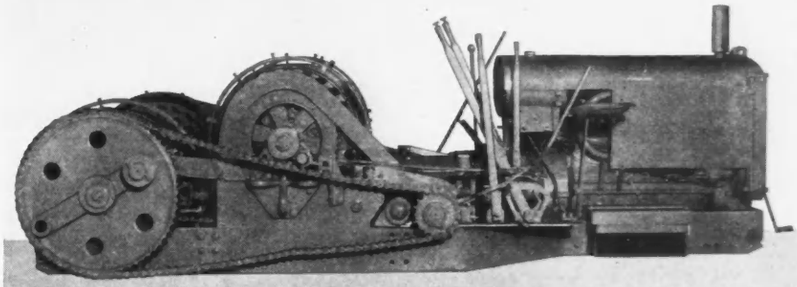
REX DEEPWELL DW-3—DW-4 • REX CHABELCO 1033—1244

SEE ALL *Three*

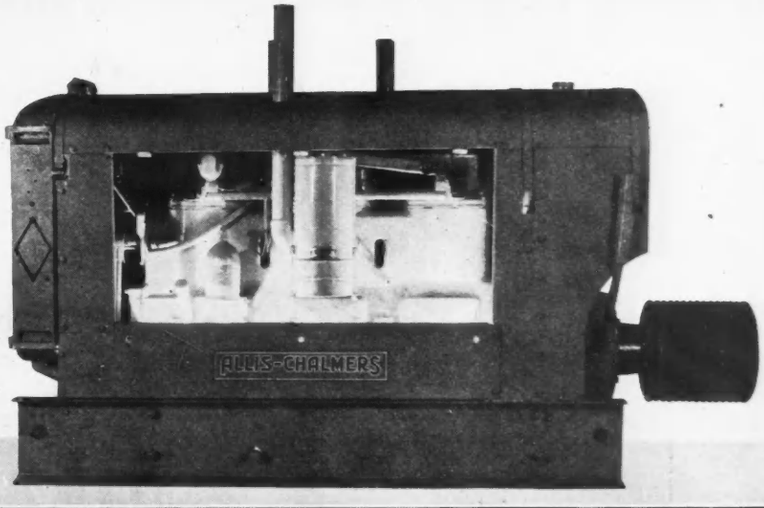
EACH ONE THE *Leader* IN ITS CLASS



Allis-Chalmers, UE Winch Tractor



A-C, UE Double Drum Skid Winch



Allis-Chalmers, L-90 Power Unit

As Allis-Chalmers led in the application of heavy duty tractor motors to oil field equipment—was first to use low pressure air tires on tractors, and first to build high speed tractors for oil field purposes. It is natural that Allis-Chalmers well servicing equipment is complete—a unit for every purpose and any depth well. Showing *seventeen* models of hoisting units and *six* sizes and types of power engines.

ALLIS-CHALMERS

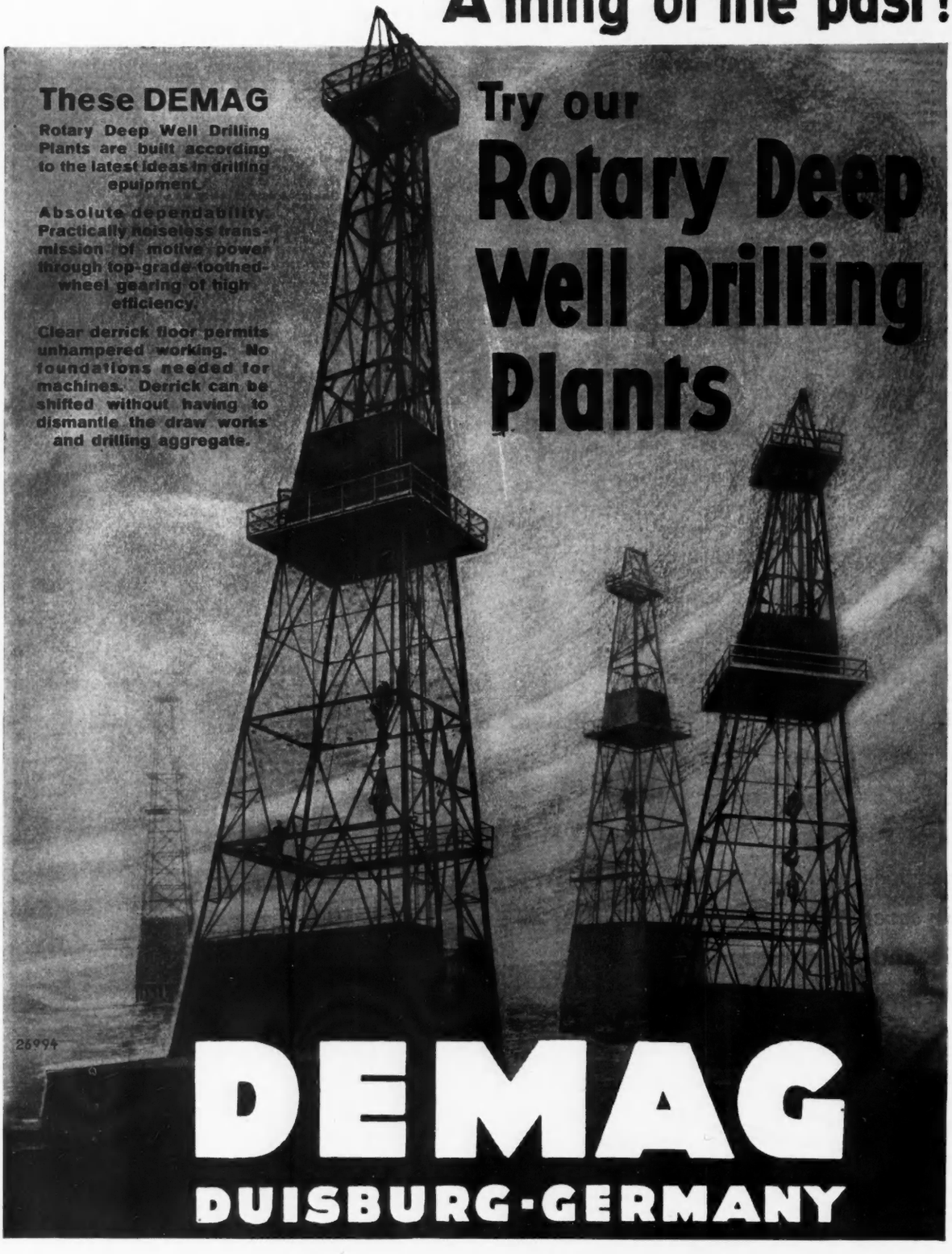
FRED E. *Cooper*

Office and Plant
HALE STATION

P.8904 ... Box 1890
TULSA, OKLAHOMA

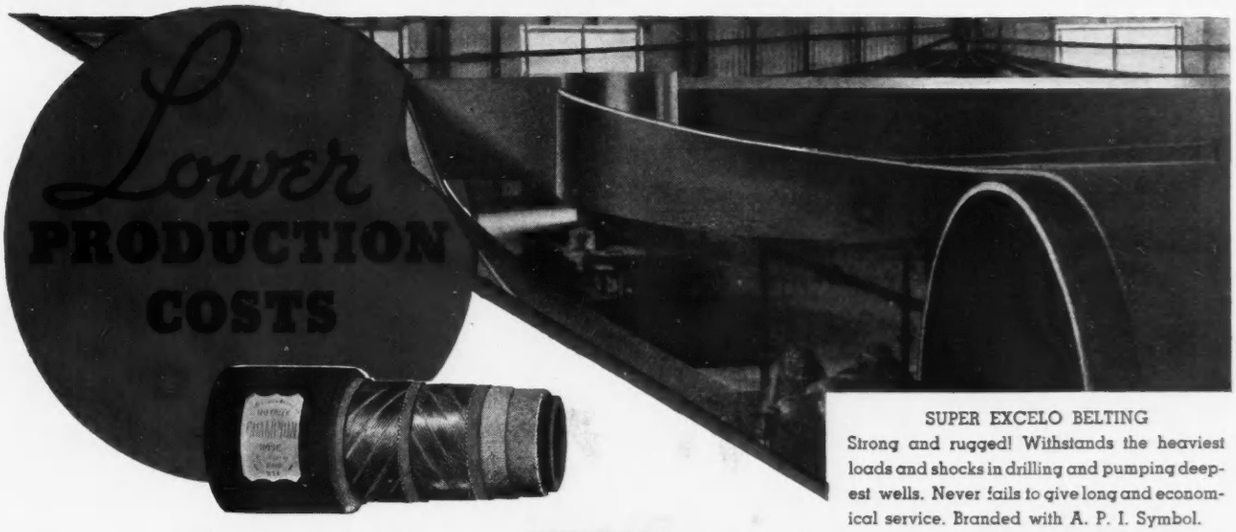
Chain Breakage

A thing of the past!


These DEMAG
Rotary Deep Well Drilling Plants are built according to the latest ideas in drilling equipment.
Absolute dependability. Practically noiseless transmission of motive power through top-grade toothed-wheel gearing of high efficiency.
Clear derrick floor permits unhampered working. No foundations needed for machines. Derrick can be shifted without having to dismantle the draw works and drilling aggregate.
Try our
Rotary Deep Well Drilling Plants
26994
DEMAG
DUISBURG-GERMANY

REPUBLIC

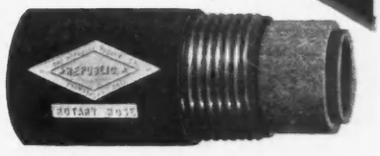
OIL COUNTRY ROTARY BELTING and HOSE



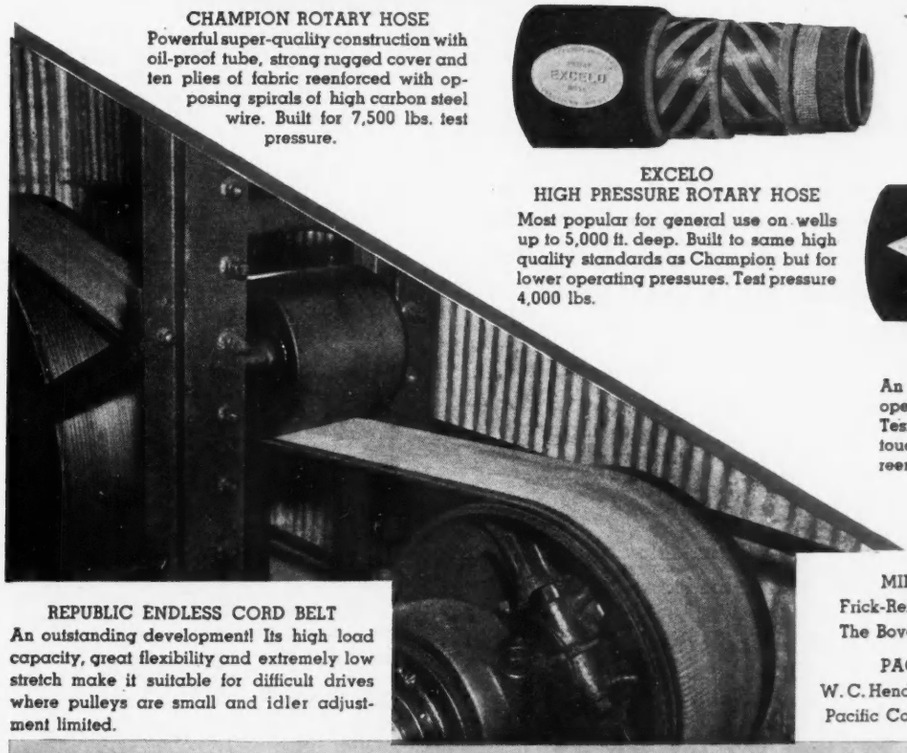
SUPER EXCELO BELTING
Strong and rugged! Withstands the heaviest loads and shocks in drilling and pumping deepest wells. Never fails to give long and economical service. Branded with A. P. I. Symbol.

CHAMPION ROTARY HOSE
Powerful super-quality construction with oil-proof tube, strong rugged cover and ten plies of fabric reenforced with opposing spirals of high carbon steel wire. Built for 7,500 lbs. test pressure.

EXCELO
HIGH PRESSURE ROTARY HOSE
Most popular for general use on wells up to 5,000 ft. deep. Built to same high quality standards as Champion but for lower operating pressures. Test pressure 4,000 lbs.



REPUBLIC ROTARY HOSE
An excellent hose for shallow wells where operating pressures do not exceed 900 lbs. Test pressure 2,000 lbs. Has oil-proof tube, tough rubber cover and ten plies of fabric reenforced with one layer of heavy wire.



REPUBLIC ENDLESS CORD BELT
An outstanding development! Its high load capacity, great flexibility and extremely low stretch make it suitable for difficult drives where pulleys are small and idler adjustment limited.

MID-CONTINENT DISTRIBUTORS
Frick-Reid Supply Corporation, Tulsa, Okla.
The Bovaird Supply Company, Tulsa, Okla.

PACIFIC COAST DISTRIBUTORS
W. C. Hendrie & Company, Inc., Los Angeles, Calif.
Pacific Coast Rubber Co., San Francisco, Calif.

THE REPUBLIC RUBBER CO.

YOUNGSTOWN, OHIO

Manufacturers of Rotary and all other types of Hose, Transmission Belting, Packing, Gaskets, Rings, etc. for Oil Country Service.

You can credit FWD's dependable performance to its

Controlled Power

IN the oil fields today, there are hundreds of FWD Trucks rendering dependable and economical service. They get in and out of those derrick-dotted fields over mud and sand "road beds," carry full loads of machinery and supplies to the rigs . . . They handle trucking assignments too difficult for ordinary trucks.

Such performance is a tribute to the design and construction of FWD Trucks . . . Their many features are summed up in *Controlled Power* . . . Scientific power and load distribution over four driving wheels — positive traction — reserve power — wide range of gear ratios — and "operator control."

Include FWDs in your fleet for safe — dependable and economical transportation regardless of roads or loads.

FWD

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
***Canadian Factory*, KITCHENER, ONTARIO**

TRUCKS
1½ TO 15 TONS

5 STEPS TO UNMATCHED TRUCK PERFORMANCE » » »

1. GREATER SAFETY. Front axles are set back, resulting in **power,** as well as load being distributed to all four wheels. This gives the FWD sure footing on slippery pavements, in congested traffic, and when going around curves.

2. GREATER DEPENDABILITY OF SERVICE. Reserve power, rugged construction throughout, and true application of the four-wheel-drive principle, insure continuous operation under any condition. Backed by a nation-wide organization of parts depots and service men available at a moment's notice.

3. FASTER SERVICE. FWDs, with their powerful engines, wide range of gear ratios and four-wheel traction cut down trip time by being able to "make" the hills, curves, and poor going, faster than average trucks. No necessity for overspeeding on the straight stretches.

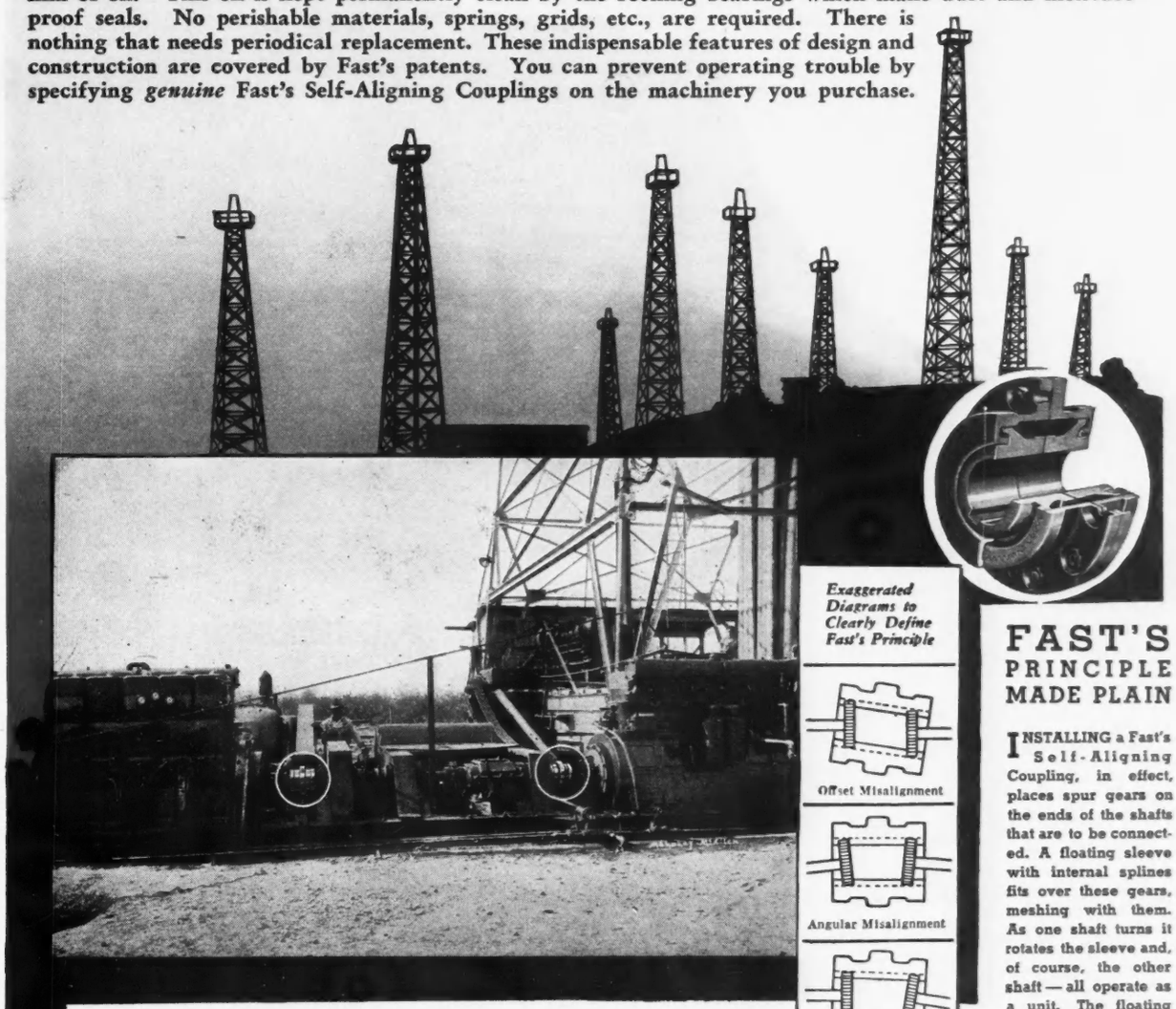
4. WIDER RANGE OF OPERATION. Four-wheel traction enables the FWD to handle its regular hauling job easily and do the tough jobs as a matter of course.

5. OPERATING ECONOMY. Definite savings are made in gasoline, tire wear, maintenance cost, and other "out-of-pocket" expenses. This is the result of equal distribution of power, load, and scientific four-wheel-drive construction throughout.

CONTROLLED POWER ON AND OFF CONCRETE

Experience has made FAST'S COUPLINGS the standard on drilling rigs

EXPERIENCE on "tough" jobs where delay costs thousands of dollars in liquid gold has caused engineers to specify *genuine* Fast's Self-Aligning Couplings on drilling rigs, pump drives and other field and refinery equipment. Experience has proved that Fast's Couplings will give trouble-free performance during the entire life of the connected machines. There are many sound reasons for Fast's unparalleled reputation with practical oil men. The load-carrying surfaces are protected against wear by a positive film of oil. This oil is kept permanently clean by the rocking bearings which make dust and moisture proof seals. No perishable materials, springs, grids, etc., are required. There is nothing that needs periodical replacement. These indispensable features of design and construction are covered by Fast's patents. You can prevent operating trouble by specifying *genuine* Fast's Self-Aligning Couplings on the machinery you purchase.

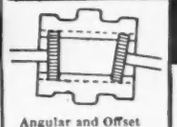


Fast's Self-Aligning Couplings on Sheldon-Burden drilling rig. The Mercedes Petroleum Company.

Exaggerated Diagrams to Clearly Define Fast's Principle

Offset Misalignment

Angular Misalignment



Angular and Offset Misalignment

FAST'S PRINCIPLE MADE PLAIN

INSTALLING a Fast's Self-Aligning Coupling, in effect, places spur gears on the ends of the shafts that are to be connected. A floating sleeve with internal splines fits over these gears, meshing with them. As one shaft turns it rotates the sleeve and, of course, the other shaft — all operate as a unit. The floating sleeve forms a dust and moisture proof jacket that contains oil which prevents wear.

THE BARTLETT HAYWARD COMPANY
BALTIMORE, MARYLAND

Russell
McPherson
WICHITA
District Office
Covers
TAU
THE MID-CONTI
TULSA
General Offices
Borger
Oklahoma City
Seminole
Ada
TAUBMAN
Willow Springs
DALLAS
District Office
REPUBLIC
ELECTRIC WELD
CASING TUBING
LINE PIPE
Pittsburgh
Seamless
CASING TUBING
DRILL PIPE
HOUSTON
District Office
Corpus Christi
General Offices: NATIONAL BANK OF TULSA BUILDING, TULSA, OKLAHOMA

QUALITY – QUANTITY & SERVICE

AUBMAN

TINENT AND GULF COAST

N SUPPLY CORPORATION

When the Taubman Supply Corporation was founded in 1920 we concentrated our efforts on the buying and selling of Dependable Used Tubular Products. Shortly after the inception of our Company, the Oil and Gas Fraternity responded so wholeheartedly to the TAUBMAN Policy of doing business, we found it necessary to add New Tubular Products to supply our customers' demands.

Today, although we are employing over a Million Dollars in the Used Material Division, it is only a "Service Unit" in our organization, the majority of our business being the distribution of new pipe. We carry comprehensive stocks of Republic Electricweld and Pittsburgh Seamless at our various branches.

Our faith in the Industry and our obligation to our loyal friends and customers is exemplified by the fact that today TAUBMAN SERVICE is available in every active Mid-Continent field from Kansas to the Gulf Coast and South Texas.

Serving the Gulf Coast and surrounding territory, our Plant at Houston, when completed, will be one of the most modern equipped pipe machine shops and yards of its kind.

With the opening of our new Branch at Corpus Christi, Texas, we have ten Branches, seven of which are equipped with the latest Landis Pipe Threading machines handling Grade "C" and Grade "D" pipe, A.P.I. and standard threads from 1" to 20" inclusive, depending upon the maximum size required for each District.

The TAUBMAN personnel is trained to expertly serve the Oil and Gas Industry for its various needs, Tubular Products for all purposes being our specialty.

WATCH FOR OUR IMPORTANT ANNOUNCEMENT ON ADDITIONAL BRANCHES!

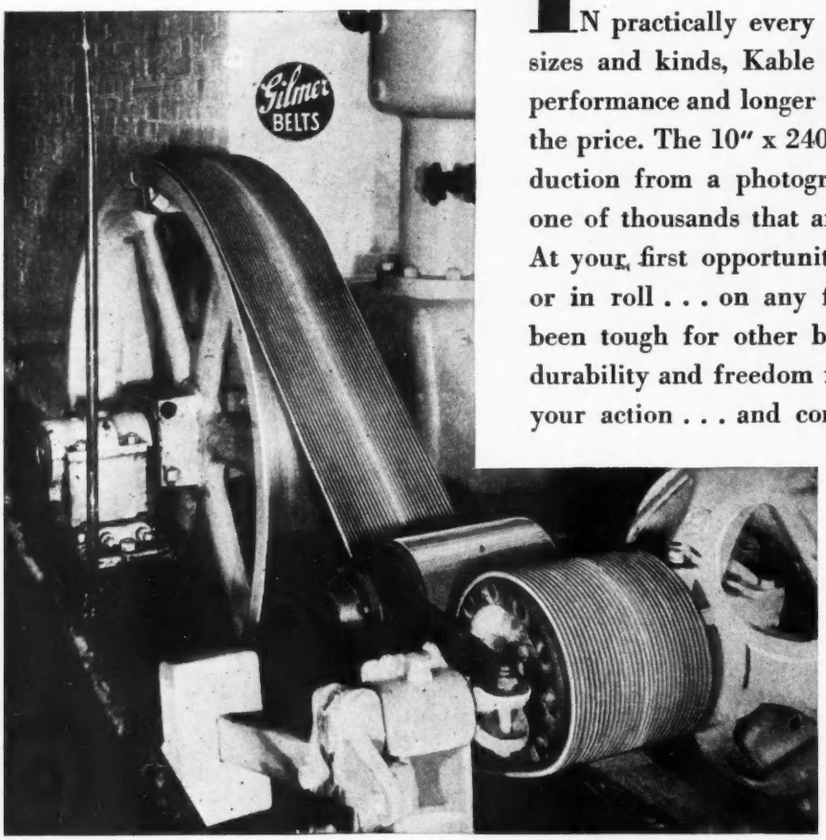
YARDS AND MACHINE SHOPS

OKLAHOMA	Tulsa
	Oklahoma City
	Ada
	Seminole
TEXAS	Houston
	Corpus Christi
	Borger
	Willow Springs
KANSAS	McPherson
	Russell

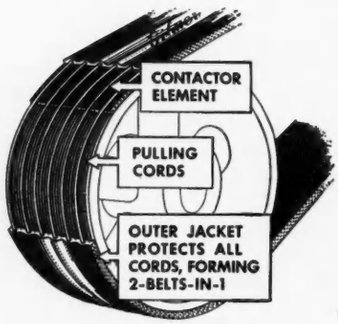
District Offices: Magnolia Building, DALLAS; Taubman Plant, HOUSTON; Union National Bank Building, WICHITA

KABLE KORD

challenges any flat belt you are using!



IN practically every industry . . . on flat drives of all sizes and kinds, Kable Kord is demonstrating superior performance and longer life over belting that cost double the price. The 10" x 240" Kable Kord, seen in the reproduction from a photograph of a refrigeration drive, is one of thousands that are saving money for their users. At your first opportunity, **try Kable Kord** . . . endless or in roll . . . on any flat drive, preferably one that's been tough for other belting. Kable Kord's efficiency, durability and freedom from attention alone will justify your action . . . and comparative costs will amaze you.



TWO-BELTS IN-ONE

NORVELL-WILDER SUPPLY CO.
Beaumont, Houston and Fort Worth, Texas
Shreveport and Lake Charles, Louisiana

R. & J. DICK COMPANY
San Francisco, Cal., Seattle, Wash.
Pacific Coast Distributors

Write today for a free copy of the Kable Kord Data Book.

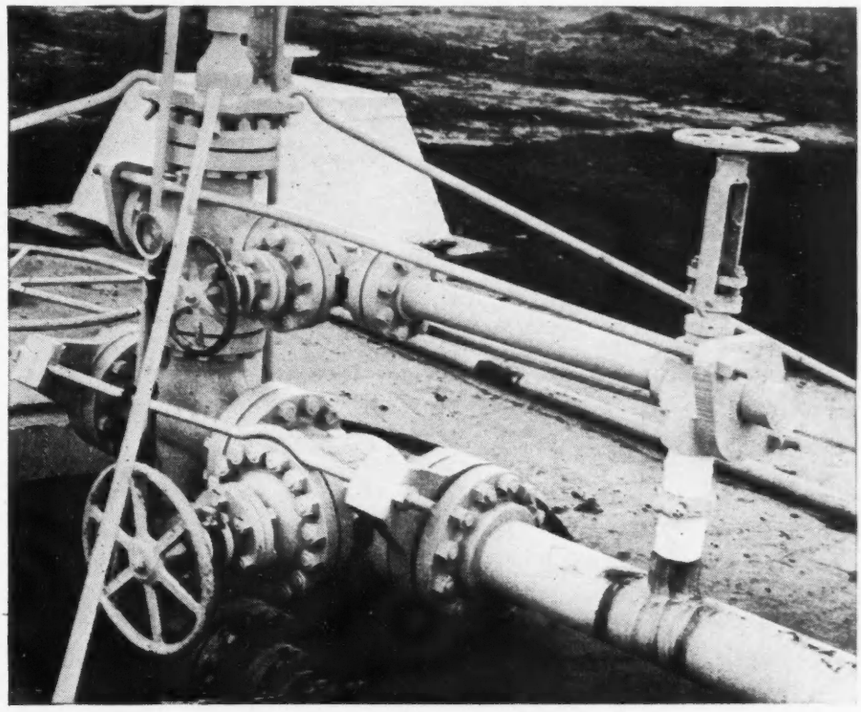
L. H. GILMER COMPANY
Tacony Philadelphia

Manufacturers **OF COMPLETE LINE OF POWER BELTING**

V-belts · Kable Kord Roll and Endless Flat Belting · Planer Belts · Speedage Endless Fabric Belts · Cone Belts
Roving Frame Belts · Moulded Rubber Belts · Winder Belts · Spinner Belts · Refrigerator and Washing Machine Belts
Conveyor Belts · Round Roll and Endless Fabric Belting · Endless Belting · Endless Cotton Belts · Laundry Feed Ribbons

SPECIALISTS IN QUALITY BELTS SINCE 1903

KEROTEST



"BOY—WHAT A SWEET WELL"

You're right—it's a 100 per cent complete Kerotest Christmas Tree using 5000 lb. test valves and fittings throughout—matched and mated by Kerotest engineers to meet the specific requirements of this producing well . . . so solid and substantial yet so simple and easy to assemble and handle right in the field.

Two seven inch Type "W" Flanged Kerotest Drilling Valves are mounted on the casing and bolted together to provide the main control. Full casing flow is possible through the seven inch cross at the bottom while the pro-rated flow is handled through the upper cross with 4" flanged outlets and valve.

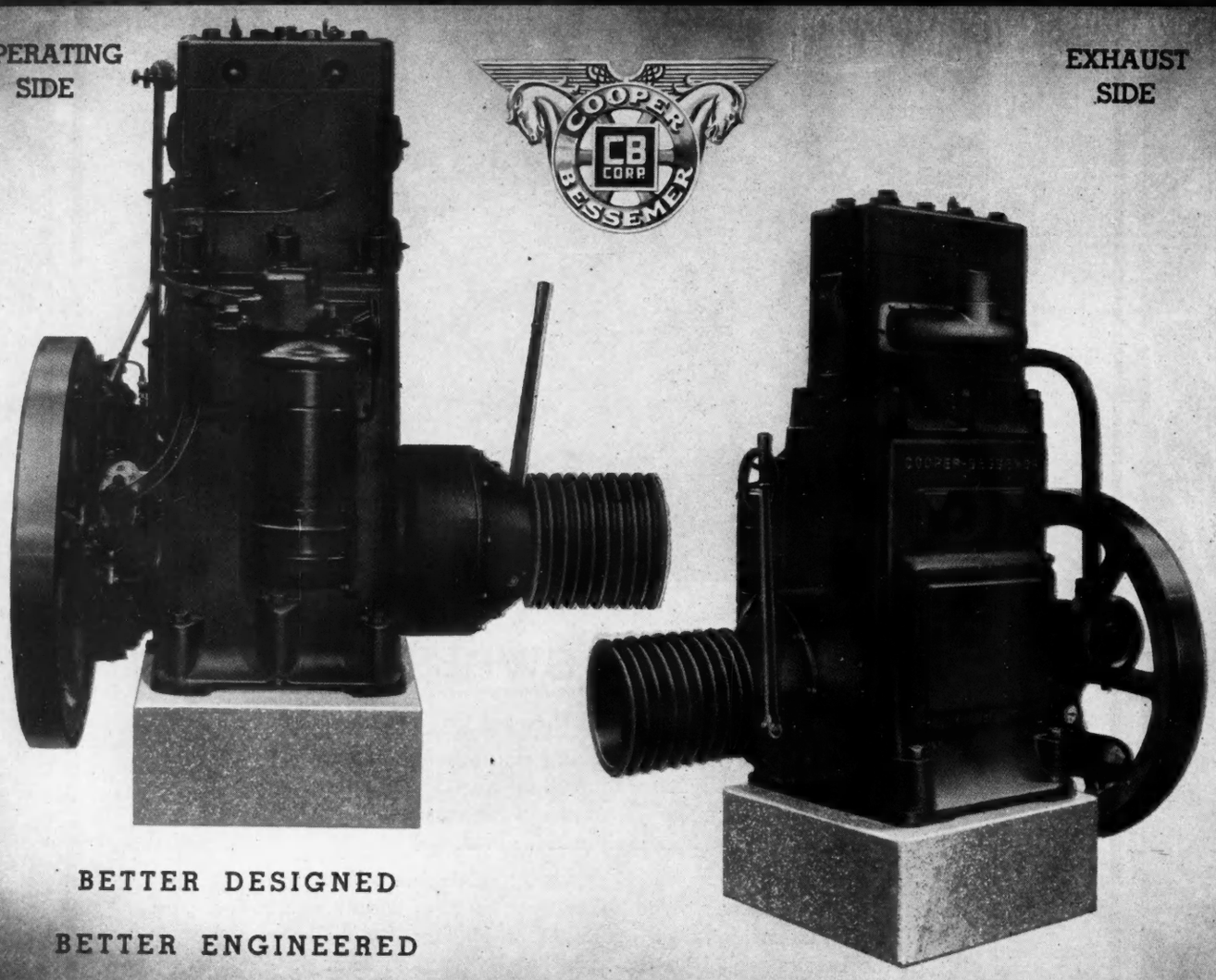
The Kerotest Forged Steel Control Choke is adjustable for any opening desired, thus providing accurate flow control for all requirements. Kerotest Armco Ingot Iron Gaskets were used throughout.

Why not avail yourself of Kerotest service? The broad experiences of Kerotest engineers in the design and assembly of complete Christmas Trees is yours for the asking. Just say the word and we shall be happy to assist you.

KEROTEST MANUFACTURING CO.
PITTSBURGH, PENNSYLVANIA

KEROTEST

A Better 40 HORSE



BETTER DESIGNED

BETTER ENGINEERED

COMPACT AND LIGHT — YET BUILT TO LAST!

Not just "another vertical." Far from it! The new Type G-SD is so much better designed and so much better engineered that it will make history in the oil fields for years to come. This is a real "he-man" pumping engine (2-cycle gas or Diesel) that is not only inexpensive to install, but also economical to run!

Every single detail of construction has had the benefit of all the talent to originate, and all the skill to produce, that is at the command of a century old engine builder. And when Cooper-Bessemer builds a pumping engine, Cooper-Bessemer builds it RIGHT!

Impartial observers who have studied its design, and have watched it at work, have pronounced Type G-SD the outstanding engine of its type. And the units now operating in the field have shown better performance — far better performance — than even Cooper-Bessemer expected.

Talk to our representative about this new 40-horse Vertical. Get him to show you how its operating advantages — the result of careful, experienced, unhurried engineering — WILL LOWER YOUR PUMPING COSTS.

Vertical Pumping Engine

COOPER-BESSEMER

Announces the

TYPE G-SD

NOW YOU CAN HAVE SLOW-SPEED RELIABILITY IN HIGH-SPEED ENGINE SPACE!

LOOK AT THESE FIELD-PROVED FEATURES!

1—Rated 40 H. P. at 400 r.p.m.

2—Low initial cost—hundreds of dollars less than horizontal types, and tons lighter.

3—Minimum foundation and housing costs (can be operated in the open, if desired).

4—Sturdy, counterbalanced crankshaft.

5—Crossheads of modern type.

6—Heavy-duty roller bearings.

7—Constant or variable speed governor.

8—Air filter is standard.

9—Built-in lube-oil pump and lube-oil filter. Full-pressure lubrication.

10—Low consumption of lube oil.

11—Built-in water pump.

12—Can be equipped to drive a radiator fan.

13—Clutch or straight pulley drives.

14—Convertible for oil or gas fuel.

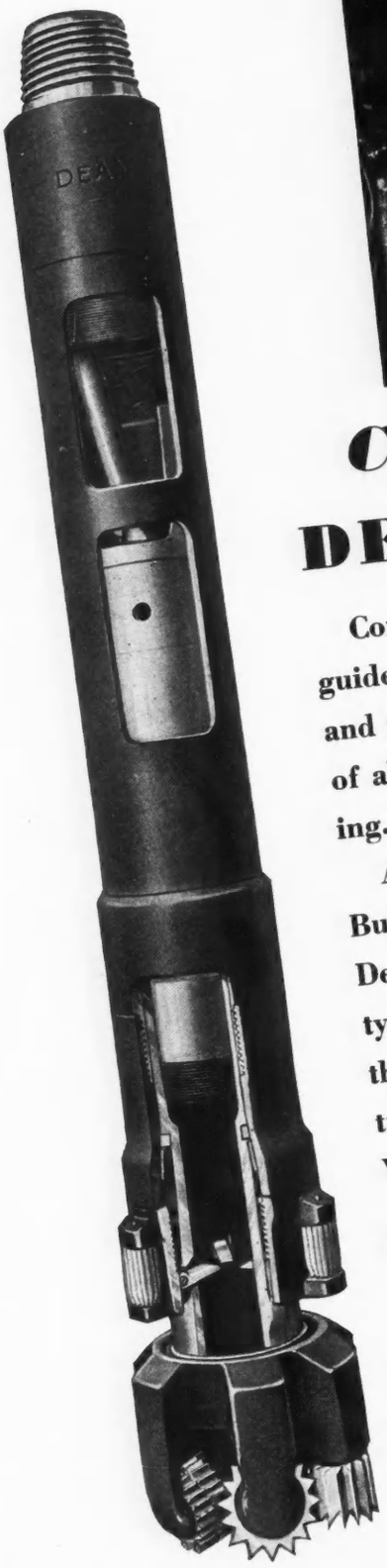
15—Can be equipped for air starting.

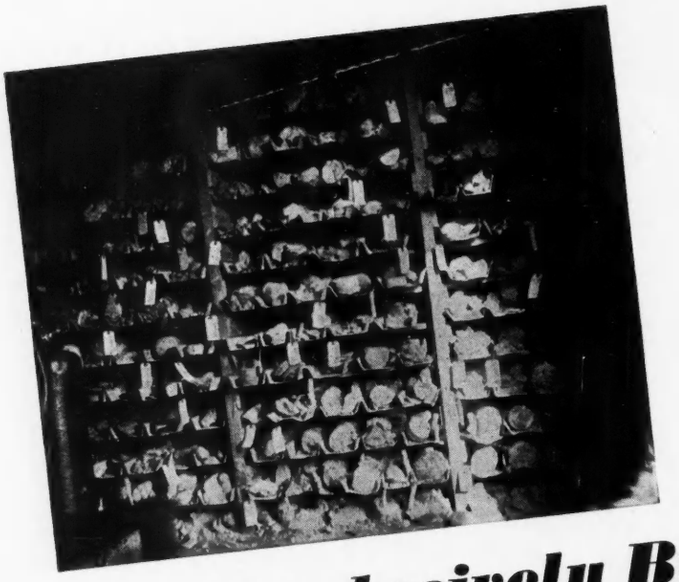
THE COOPER-BESSEMER CORPORATION

Mt. Vernon, Ohio — PLANTS — Grove City, Pennsylvania

25 West 43rd St. New York City | Mills Bldg. Washington, D. C. | 640 East 61st St. Los Angeles, Calif. | 201 East First St. Tulsa, Oklahoma | 631 Spring St. Shreveport, La. | Magnolia Bldg. Dallas, Texas | Esperson Bldg. Houston, Texas

L. W. Rogers, 6 Finsbury Square, London, E. C. 2





Cores Exclusively By
DEAN CORE DRILLS

Cores like those illustrated above are invaluable as guides to intelligent drilling procedure in both wildcat and proven territory. They present a clear vivid picture of all formations *just as they are in the hole.* No guessing. No mistakes. They are dependable.

All the cores shown here were recovered from the Butler, No. 1 wildcat well at Puente, California, with Dean Core Drills exclusively; using both regular and rock type core heads. Sufficient evidence for most anyone of the efficiency of these dependable coring tools. Manufactured in all standard sizes from 5⅝″ to 27″ diameter. Write for illustrated, descriptive bulletin.

DEAN CORE BARREL MFG. SALES & SERVICE
3200 Alameda Boulevard, Route 2, Box 3200, Compton, California

Derrick Man JACK PITTS inspects one of the Dean regular type core heads used to core the Butler No. 1 wildcat well at Puente, California.

AQUAGEL

CONTROLS MUD CAKE THICKNESS ON THE WALLS OF THE HOLE

TESTS conducted under identical conditions of temperature and pressure to those existing in wells of varying depths, have shown that the addition of AQUAGEL to drilling mud has reduced the thickness of mud cake on the walls of the hole as much as 13/16 of an inch. From an operating standpoint, the thinner cake thus built has advantages which are very apparent.

In addition to these advantages, the thin mud sheath represents an actual *saving* amounting to *hundreds of barrels* in the quantity of native drilling mud used in a well of reasonable depth. In other words, mud solids from a large quantity of drilling fluid are required to build this extra mud cake thickness. Besides the many other advantages of a thin, impervious cake such as is provided by AQUAGEL, this *saving* in the cost of an unnecessary quantity of native mud will pay for the greater amount of the cost of the AQUAGEL used. In some cases, where transportation costs from the source of supply are low, complete costs of the AQUAGEL required to reduce cake thickness can be returned out of *savings* on the native mud. Even where transportation costs are higher at points farther removed from the source of manufacture, the *savings* on native mud will pay for a greater part of the AQUAGEL used.

Thick mud cakes, in addition to increasing the hazard of stuck tools and casing, indicate that considerable water has gone into the formation. This fact in itself frequently causes trouble, and very often formations which are generally very difficult to drill through can be successfully and easily penetrated when the water is kept out of the formation. AQUAGEL also minimizes the abrasive qualities of sand in drilling mud, and its unusual lubricating characteristics prevent wear on moving parts. Due to the gel-forming ability of AQUAGEL, cuttings are readily brought to the surface.

AQUAGEL helps prevent many drilling difficulties. Use it for *best results!*

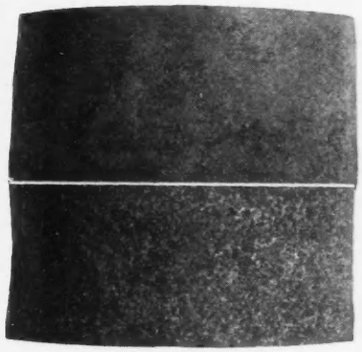
BAROID PRODUCTS

BAROID . . Extra-Heavy Colloidal Drilling Mud
AQUAGEL Trouble-Proof Colloidal Drilling Mud
STABILITE An Improved Chemical Mud Thinner
BAROCO . An Economical, Salt Water-Resisting Drilling Clay
FIBROTEX A Very Effective Material For Preventing or Regaining Lost Circulation In Drilling Wells

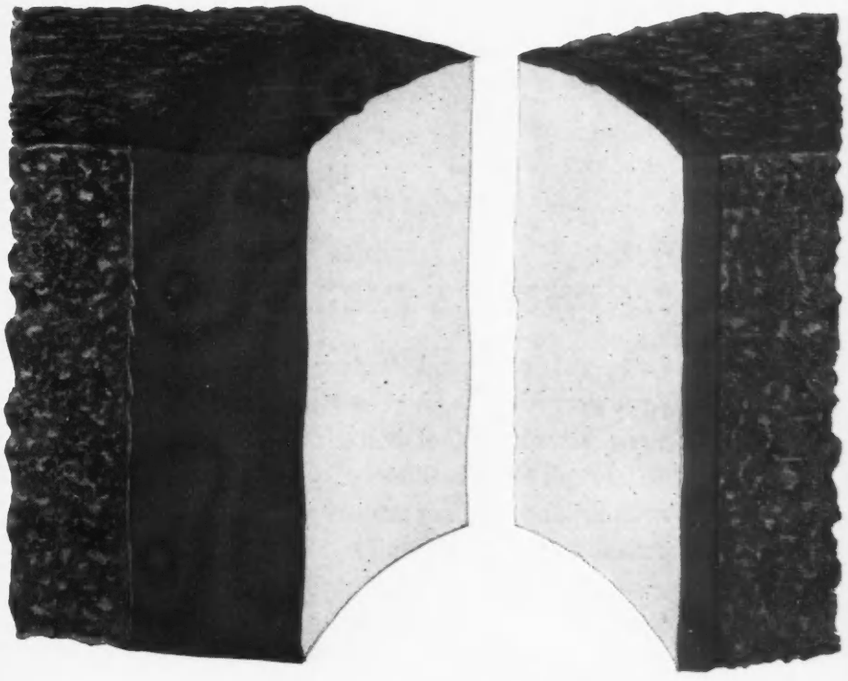
Stocks carried and Service Men available in all active oil fields.
(Baroco in Mid-Continent and Gulf-Coast only)

WHICH DO YOU PREFER?

Thick filter cake (shown above white line) built up in Filter Press test by mud containing no AQUAGEL.



Thin filter cake (shown above white line) deposited in Filter Press test by mud containing a small percentage of AQUAGEL.



Muds lacking sufficient quantities of colloidal material build thick walls in the hole, increasing the hazards of landing casing and helping to cause stuck tools.

Muds having the proper percentage of AQUAGEL produce thin, impervious cakes which decrease drilling troubles and *increase savings* because less native mud is required.

SEE OUR EXHIBIT AT THE TULSA SHOW

BAROID SALES COMPANY

LOS ANGELES • TULSA • HOUSTON

NATIONAL PIGMENTS & CHEMICAL COMPANY, ST. LOUIS

SEAMLESS SUPREMACY

IN THE OIL FIELDS . . .

Long years of hard drilling experience have proved beyond question the supremacy of seamless steel drill pipe and casing. Pittsburgh Seamless has played its part in establishing this supremacy and keeps on demonstrating it day after day, year after year. "Pittsburgh" is preferred in many quarters because of its well known ability to go farther and do more.

PITTSBURGH STEEL COMPANY

PITTSBURGH • PENNSYLVANIA

New York Detroit Chicago St. Louis Tulsa
Houston Los Angeles San Francisco

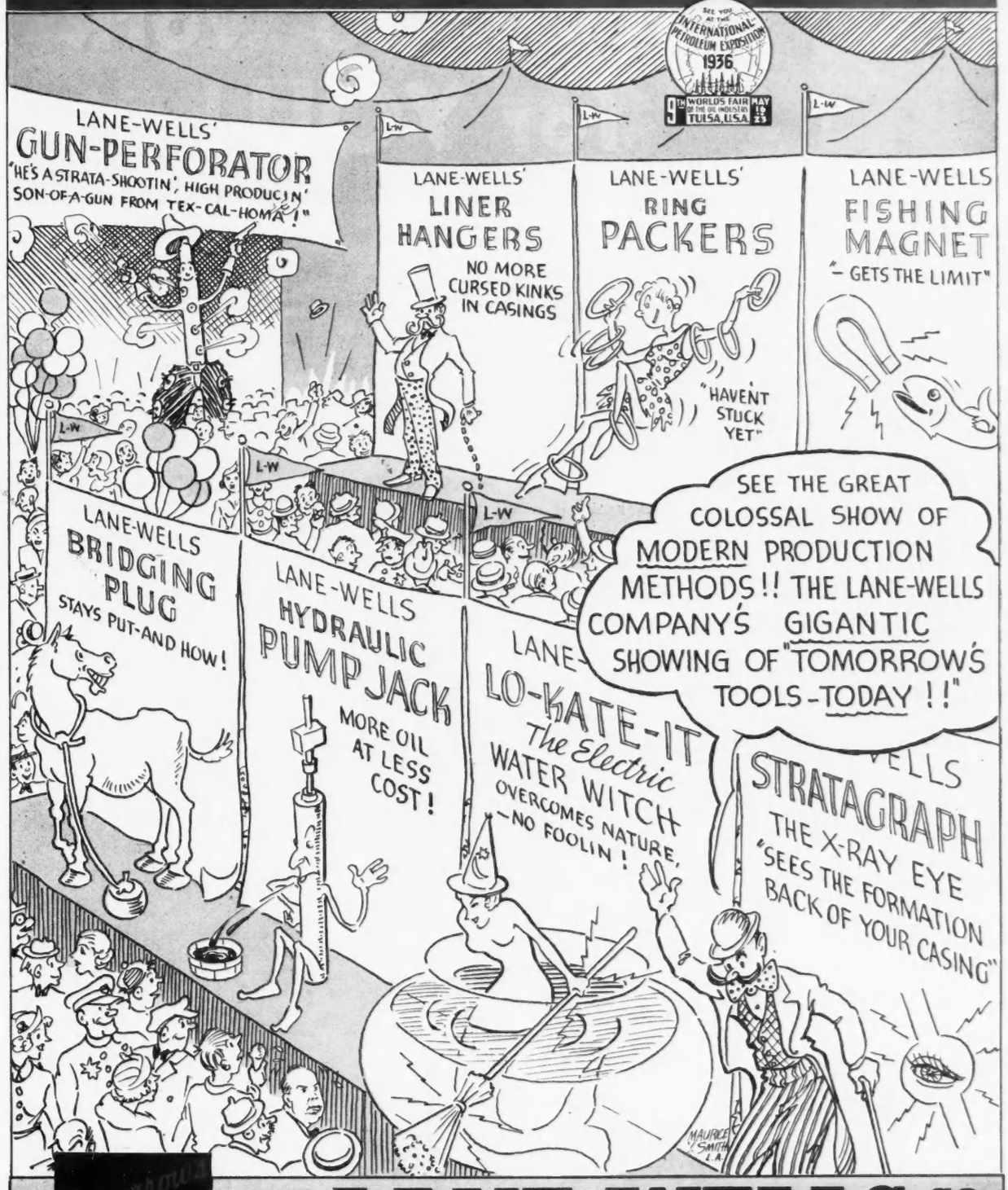
Pittsburgh P Products

Pittsburgh Seamless

DRILL PIPE • CASING

TUBING

See us at the BIG SHOW! IN TULSA!


SEE YOU AT THE INTERNATIONAL PETROLEUM EXPOSITION 1936
9TH WORLDS FAIR OF THE OIL INDUSTRY TULSA, U.S.A. MAY 15 23
LANE-WELLS' GUN-PERFORATOR
"HE'S A STRATA-SHOOTIN', HIGH PRODUCIN' SON-OF-A-GUN FROM TEX-CAL-HOMA!"
LANE-WELLS' LINER HANGERS
NO MORE CURSED KINKS IN CASINGS
LANE-WELLS' RING PACKERS
"HAVENT STUCK YET"
LANE-WELLS FISHING MAGNET
"- GETS THE LIMIT"
SEE THE GREAT COLOSSAL SHOW OF MODERN PRODUCTION METHODS!! THE LANE-WELLS COMPANY'S GIGANTIC SHOWING OF "TOMORROW'S TOOLS-TODAY!!"
LANE-WELLS BRIDGING PLUG
STAYS PUT-AND HOW!
LANE-WELLS HYDRAULIC PUMP JACK
MORE OIL AT LESS COST!
LANE- LO-KATE-IT
The Electric WATER WITCH
OVERCOMES NATURE, -NO FOOLIN!
ELLS STRATAGRAPH
THE X-RAY EYE
"SEES THE FORMATION BACK OF YOUR CASING"
L-W
MAURICE Y. SMITH L.A.

Tomorrow's Tools-Today!

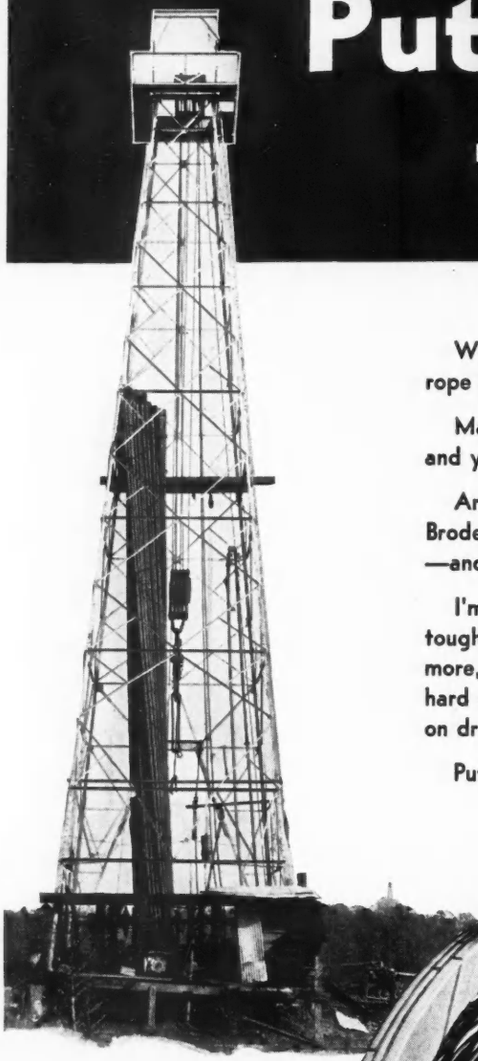
THE LANE-WELLS CO.

Gun Perforator Service

LOS ANGELES, CALIFORNIA . . . . NEW YORK CITY, NEW YORK

THE LANE-WELLS CO. OF TEXAS • HOUSTON AND CORPUS CHRISTI' ○ THE LANE-WELLS CO. OF OKLAHOMA • OKLAHOMA CITY AND TULSA

Put ME to work for YOU!



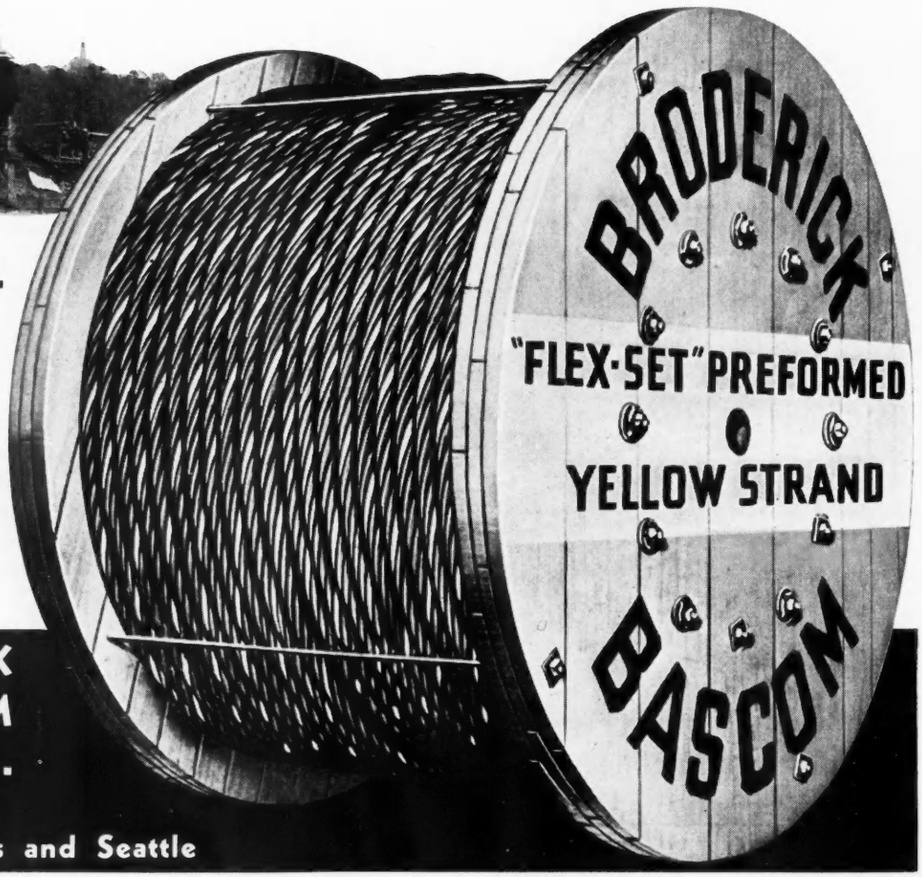
Why not? I'm "Flex-Set" Preformed Yellow Strand, the toughest rope that ever ran and landed a string of casing.

Maybe you think I'm boasting. Well, just put me to work for you and you'll soon find out how tough I am.

And why shouldn't I be tough? My wires are especially drawn to Broderick & Bascom's specifications. And are those specifications high—and exacting! I'll say they are!

I'm preformed, which adds a lot of other good qualities to my toughness. It makes me limber—easy to handle and install. What's more, by preforming, I'm practically pre-broken in, so you can work me hard and fast soon after putting me on. And how I do resist crushing on drums! You'll be surprised.

Put me to work for you right now. I'm tough.



The CONTINENTAL SUPPLY CO.

Mid-Continent and Rocky Mountain Distributors

•

MURRAY-BROOKS HARDWARE CO.

South Louisiana Distributors

T-20R1

BRODERICK & BASCOM ROPE CO.

ST. LOUIS

Factories: St. Louis and Seattle

T·I·W

WORLD'S *Most Complete* LINE OF SLIPS

DO NOT CUT PIPE

—Pipe does not turn in slips and cut rings on the pipe as the slips will turn in the rotary bowl on account of the segments being wide and will not twist sideways and bind.

WILL NOT DROP THROUGH ROTARY BOWL . . . *thus preventing what frequently becomes a bad fishing job*

Patented

FIGURE 202—*T-I-W Regular Three-Piece Reliner Type Slip. 13¼" bearing surface against pipe.*

T-I-W FRICTION

RELINER TYPE, THREE-PIECE SLIPS

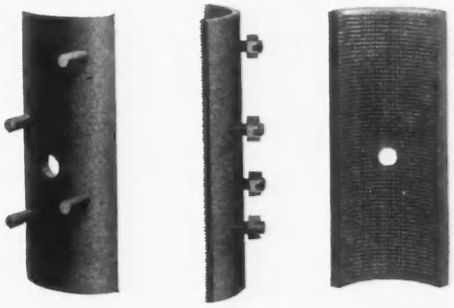
SEGMENTS KEEP PERFECT ALIGNMENT—Obviates crushing pipe.

THREE-POINT BEARING ON ROTARY BOWL—Makes for self-centering and gives uniform bearing on pipe.

SAFETY HANDLES.

LINERS CAN BE RESHARPENED MANY TIMES—Saves money.

LINERS CAN BE REPLACED WHEN COMPLETELY WORN OUT—Saves buying a complete slip which becomes a permanent investment.



Patented

FIGURE 204—*Showing knurled replaceable liners for Reliner Type Slips.*

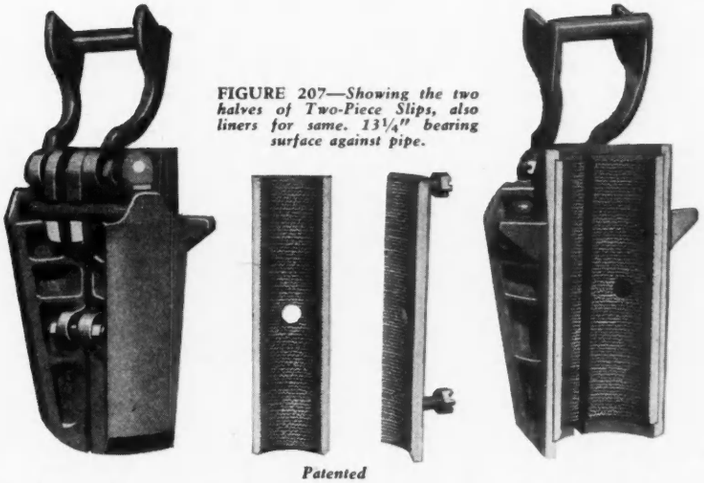


FIGURE 207—*Showing the two halves of Two-Piece Slips, also liners for same. 13¼" bearing surface against pipe.*

Patented

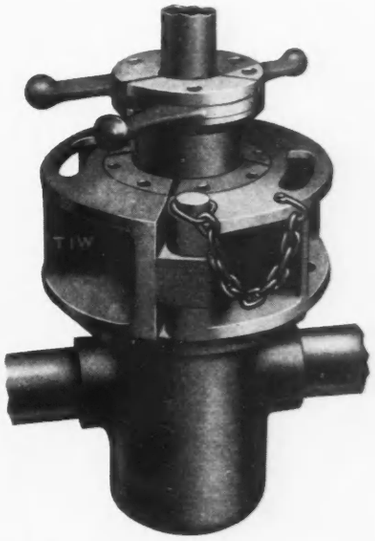
T-I-W FRICTION RELINER TYPE, TWO-PIECE SLIPS

Possess the same general advantages as the Reliner Type Three-Piece Slip.

Made in two halves, each containing two segments.

Stands hard, rough usage.

T-I-W
PRODUCTS ARE
ALWAYS
TOPS
WITH MAJOR
OPERATORS



T-I-W TUBING SLIPS AND SPIDERS

PERFECT RELEASING FEATURES—Insures against biting and crushing pipe.

THREE SEGMENTS KEEP PERFECT ALIGNMENT—Insures a uniform friction grip, protecting tubing.

DESIGNED WITH A SMALL DEGREE OF TAPER—Greatly increasing the holding capacity.

TEXAS IRON WORKS

1401-1423 MAURY ST. HOUSTON, TEXAS

"and when they saw this burnished tool joint they installed Protectors"

Unretouched Photo

When you see a burnished tool joint coming out of the hole it's a sure sign of friction somewhere down the line. Friction means wear on both the tool joint and casing. You can't *see* down in the hole. But danger lurks down there when tool joints rub and grind against the casing. Thin casing, caused by tool joint contact, leads to collapse, water intrusion and other troubles. Installation of Patterson-Ballagh Protectors eliminates the danger. When they are used the original tool marks stay on the tool joint. Friction is relieved. Drilling is speeded. Less power is required. Patterson-Ballagh Protectors will pay for their original cost over and over again.

New literature now ready.

Patterson-Ballagh's

. . . *of course*

PATTERSON-BALLAGH CORPORATION

Plant and General Offices:
1900 East 65th Street, Los Angeles, Calif., U. S. A.
Oklahoma Office:
438 Northwest 26th St., Oklahoma City, Okla.

Texas and Gulf Coast Distributors:
BETTIS SALES COMPANY
515 Merchants & Manufacturers Bldg., Houston, Texas
New York Office: 39 Cortlandt Street

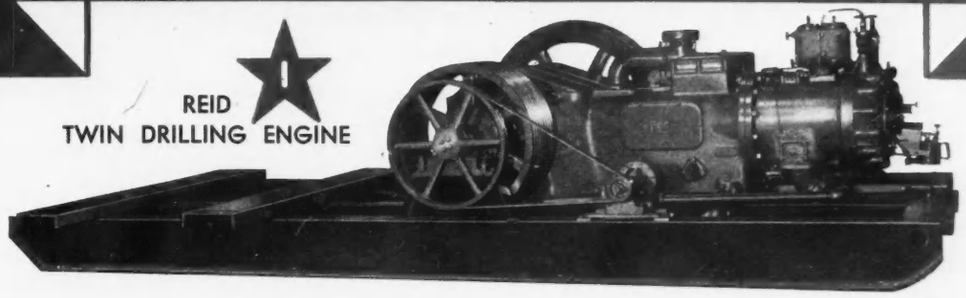
Fresh Stocks Carried at: Casper, Wyo.; Oklahoma City, Ada, Okla.; Lake Charles, Houma, La.; Hobbs, N. Mex.; Houston, Odessa, Texas; Kettleman Hills, Bakersfield, Ventura, Los Angeles, Calif.

SOLD BY ALL SUPPLY HOUSES

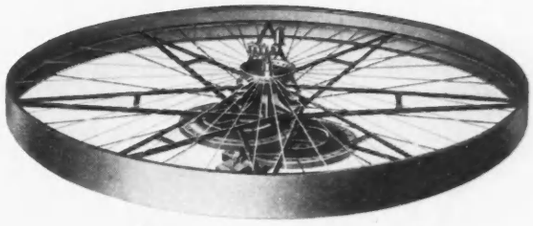
STARS of the BIG SHOW

1 2 3 4 5

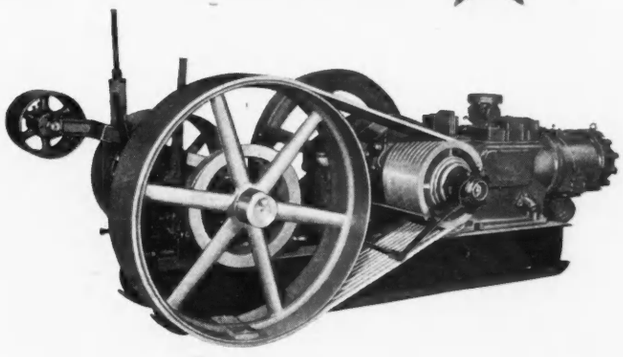
1 REID TWIN DRILLING ENGINE



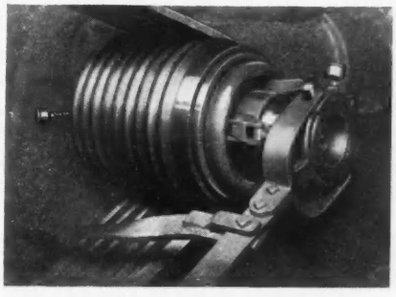
2 REID BANDWHEEL PUMPING POWER



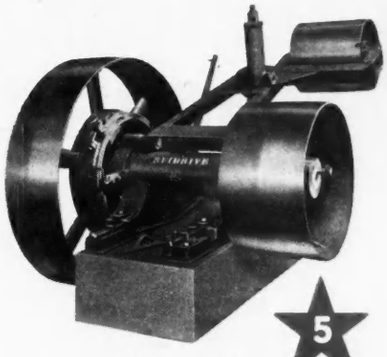
3 THE "REIDRIVE UNIT"



4 REID "TAKEOFF"



Ask any attendant at this display for complete information or descriptive literature.



5 THE "REIDRIVE"

OUTSTANDING are these Big Stars, as you will see when you look them over at the Tulsa Oil Show. Watch them perform with smoothness and precision. Notice their strength and simplicity. You will see that they are modern, and capable, for their part in the daily grind.

To achieve stardom in any show, requires consistent outstanding performances. The Daily Performance Record of Reid Machinery for the "Run of the Show", which in many instances has continued for 40 Years, has thoroughly demonstrated their performance ability. Recognition of their merit, performance, and utility is made by Oil Producers in every field, in according Reid Machinery "Top Billing" in their Daily Oil Show.

● ● ● ● ● ●

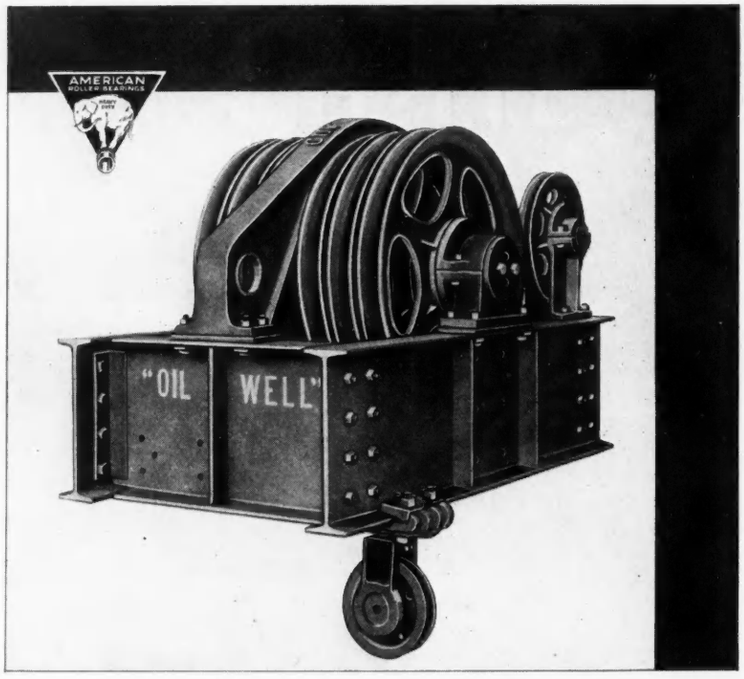
These Stars are scheduled for daily performance for the entire week, May 16 to 23, in the Frick-Reid Supply Corporation Building, No. 1 Drake Drive.

THE JOSEPH REID GAS ENGINE COMPANY

OIL CITY, PENNSYLVANIA

DISTRIBUTORS: FRICK-REID SUPPLY CORPORATION, TULSA AND PITTSBURGH — R. B. MOORE, BOLIVAR, N. Y.

A Matched Team *for* HEAVY DUTY



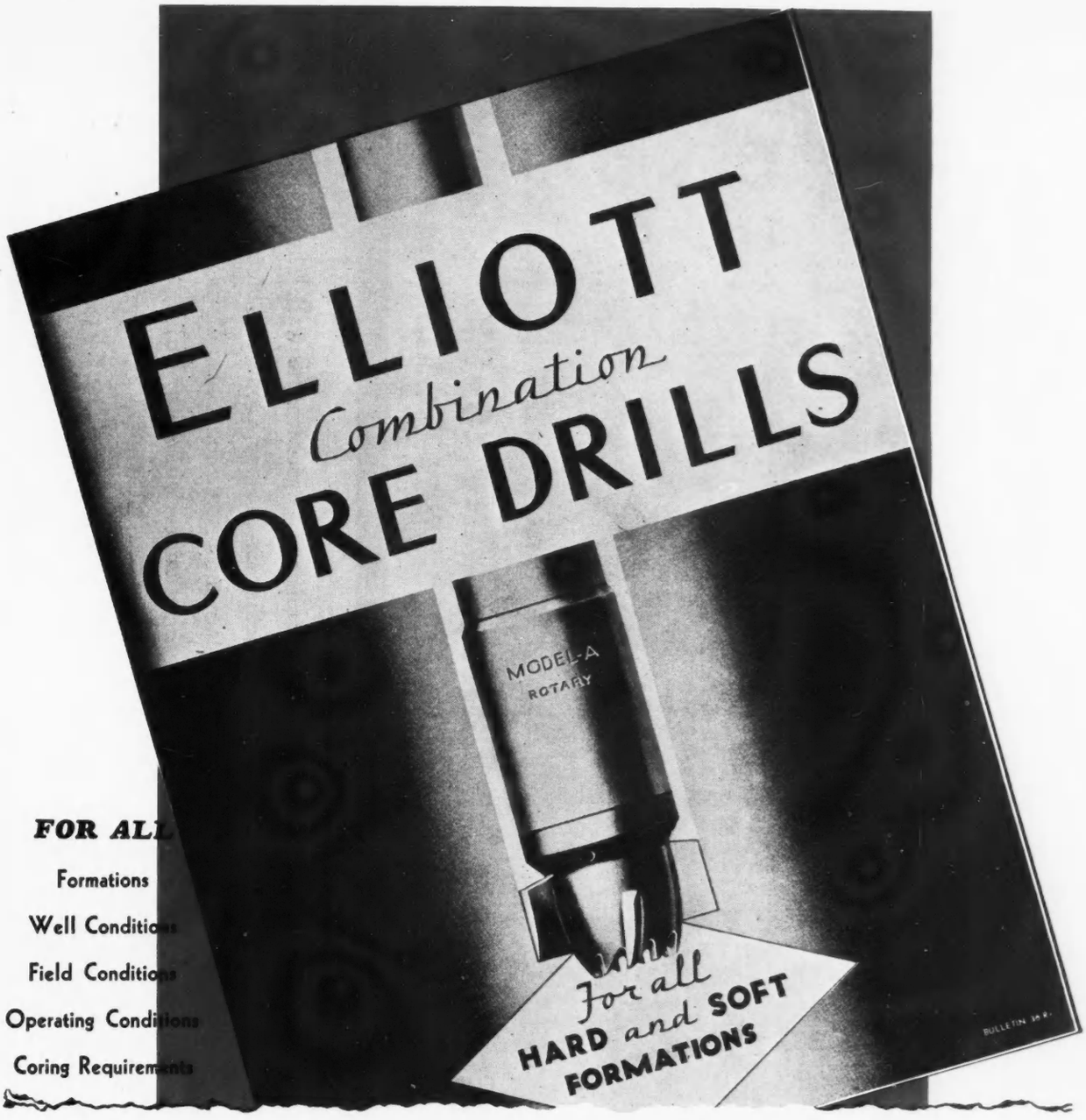
"Oilwell's" 80" Traveling Block is streamlined, has manganese sheaves and a working capacity capable of taking care of the deepest drilling. It weighs 10,080 lbs.

"Oilwell's" No. 300 Heavy Duty Double Deck Crown Block is built to team up with the 80" Traveling Block.

The sheaves on both of these "Oilwell" companion blocks operate on American Super Heavy Duty Roller Bearings. A better bearing for this service hasn't been built.

AMERICAN SUPER HEAVY DUTY ROLLER BEARINGS

AMERICAN ROLLER BEARING COMPANY, PITTSBURGH, PA.



FOR ALL

Formations

Well Conditions

Field Conditions

Operating Conditions

Coring Requirements

ELLIOTT CORE DRILLING COMPANY

4731 East 52nd Drive, Los Angeles, California, U.S.A.

Export Office: 420 Lexington Avenue, New York City

Send me a copy of your new Bulletin No. 36-R, illustrating and describing the improved Elliott Combination Core Drill with interchangeable hard and soft formation heads for coring all formations from the softest to the hardest rock.

NAME_____

COMPANY_____

ADDRESS_____

CITY, STATE AND COUNTRY_____

Tear Off Lower Portion Of Page And Send For Your Copy Now.

The S.M. JONES COMPANY
FISHING FOR FACTS MEANS LESS FISHING FOR RODS
How Deep is Your Well?
How Does it Pump and What Does it Weigh?
4 STEPS IN JONESUCKEROD SERVICE FOR PRODUCERS
Reduces ROD BREAKS
Cuts PUMPING COSTS
How Corrosive is the Fluid?
OIL
SALT WATER
How Much Hydrogen Sulphide?
See this Exhibit at Tulsa—May 16-23
International Petroleum Exposition • Booth 18 & 19—Oklahoma Bldg.

● This is an action story of four important steps in JoneSuckeRod Service to Producers — a service that has won wide acclaim and many new users for JoneSuckeRods. You will be interested in the results we are getting for others but you will be more interested in the results we can get for you. This service is another example of Jones leadership—it is thoroughgoing, based on sound engineering and complete in every detail. Let us demonstrate JoneSuckeRod Service on your most troublesome well. The S. M. Jones Company, General Office and Factory, Toledo, Ohio. Sales Department, 715 McBirney Building, Tulsa, Oklahoma — Houston Office, 1005 Sterling Building — Export Office, 19 Rector Street, New York City.

©C1B 304176

THE OIL WEEKLY

ENGINEERING « NEWS » STATISTICS

EDITORIAL STAFF

WARREN L. BAKER
Editor

J. KENT RIDLEY
Managing Editor

ASSOCIATE EDITORS

L. J. LOGAN — BRAD MILLS
WM. V. GROSS

DISTRICT EDITORS

B. F. LINZ.....Washington
FLOYD SWINDELL.....Tulsa
H. H. KING.....Fort Worth
W. E. GREEN.....Los Angeles
EARL S. POST.....San Antonio
R. W. BYRAM.....Austin
CHAS. LEYENDECKER.....Houston

PUBLISHED BY
THE GULF PUBLISHING COMPANY
HOUSTON, TEXAS

Copyright, 1936

R. L. DUDLEY, *President*
A. L. BURNS, *General Manager*
S. W. ROBINSON, *Editorial Director*

Staff correspondents at all important points.

ADVERTISING STAFF

DICK SWINSKY.....New York
W. W. PIGUE.....Pittsburgh
T. W. NELSON.....Chicago
J. F. CARTER, JR.....Tulsa
W. E. GREEN.....Los Angeles
CHAS. WYATT.....Houston
WM. ATCHESON.....Houston

J. T. WAGONER
Circulation Manager

Contents « May 18, 1936

Volume 81, Number 10

THIS WEEK 37

THE CHANGING PANORAMA 45

GENERAL NEWS:

Contradictory Policy Revives Disney Bill 38

"Hot Oil" Book Written by Congressman 38

Seeking Economies—Productivity Index Study Occupies A. P. I. Session 39
By WARREN L. BAKER

Producers Hold Key to the Immediate Future of Industry—Byles 39

Technical Progress—Trade Meetings Indicate Effort for Advancement 40

Decry Discrimination—A. P. I. Directors Speak on Tax and Dilution Ills 41

Gasoline Association Re-Elects Officers 42

Biggest Show Opens at Tulsa 45

Louisiana Oil Policy Outlined by Governor 44

Men in the Industry's News 43

Squeaks from the Bull Wheel 216

ENGINEERING AND TECHNICAL:

The Economic Life of Sucker Rods 51
By EMORY KEMLER

Degree of Reduction of Sediments in the East Texas Basin as an Index of Source Beds 60
By PARKER D. TRASK AND W. ROSS KEYTE

Rotary Drilling Practices 71
By J. E. BRANTLEY

Pressure Completion of Wells in the Fitts Pool 93
By K. R. TEIS

Back-Side Crank Pumping 105
By R. E. BRIDGES

Application of Multi-Cylinder Gas Engines 116
By D. G. KINGMAN

Productivity Index 126
By M. L. HAIDER

MARKETS AND STATISTICS 167

FIELD REPORTS 176

SPECIALIZED OIL JOURNALS
Published by
THE GULF PUBLISHING COMPANY

BRANCH OFFICES

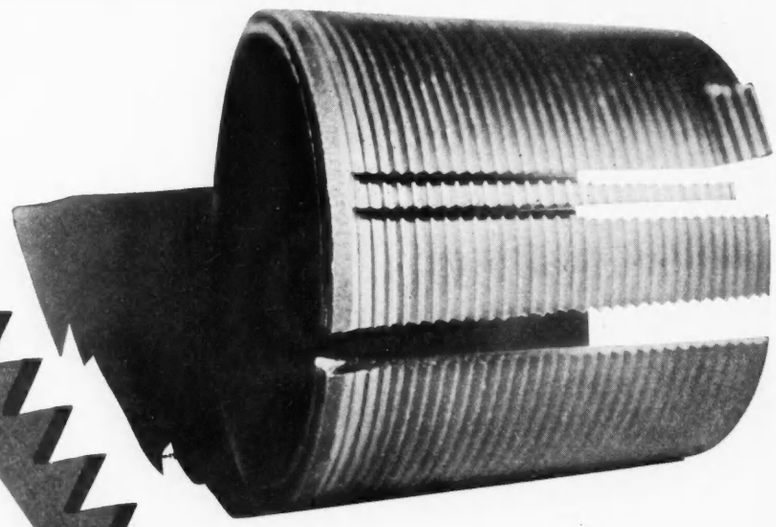
NEW YORK.....250 Park Ave.
PITTSBURGH.....Standard Life Bldg.
CHICAGO.....332 S. Michigan Ave.
LOS ANGELES.....Haas Bldg.
TULSA.....Hunt Bldg.
FORT WORTH.....W. T. Waggoner Bldg.
WASHINGTON.....Albee Bldg.

Member Audit Bureau of Circulations.
Member Associated Business Papers, Inc.

Published every Monday. Single Copies 15 cents. Subscription price: domestic and foreign, $2.00 a year. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879. Subscription restricted to those engaged in the producing and pipe line branches of the oil industry or the manufacturing and distribution of oil field supplies.

Advertising rates on application.

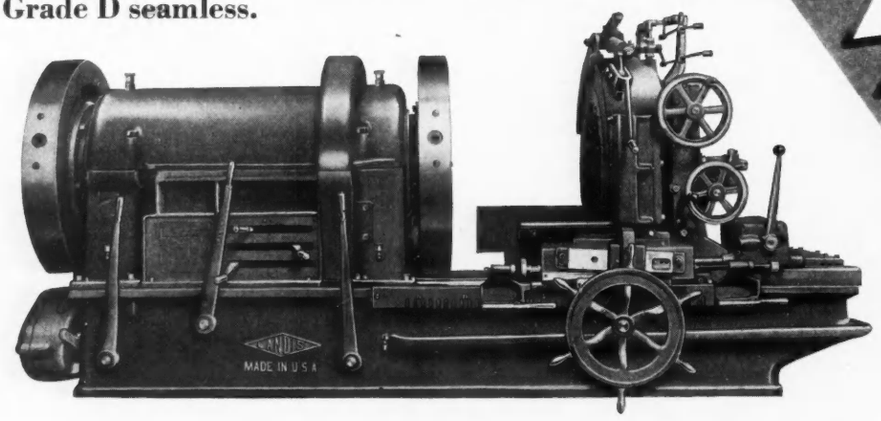
Look At this tapered thread!



Here is an unretouched photograph, enlarged, of an 8 pitch, 3/4" taper thread, 4" long, cut on *standard weight* 4" pipe with a LANDIS Receding Chaser Pipe Threading and Cutting Machine.

This thread demonstrates, in an unusually vivid manner, the remarkably free cutting action of this new LANDIS Machine. By actual measurement, *the wall thickness of the pipe at the root of the first thread was but .005".*

It is this free cutting action which accounts for the ability of the Landis Receding Chaser Pipe Machine to produce more threads, and better threads on Grade C or Grade D seamless.



Write for details on the new LANDIS Receding Chaser Pipe Threading and Cutting Machines.

LANDIS MACHINE COMPANY
Waynesboro, Penna.

MAY 19 1936

THE OIL WEEKLY

FOR OIL AND GAS PRODUCERS
AND PIPE LINE MEN

ENGINEERING NEWS STATISTICS

WARREN L. BAKER, Editor.

. . . this Week

THE Sixth Mid-Year Meeting of the American Petroleum Institute was held in Tulsa, May 12 to 15, and was one of the most interesting and best attended sessions planned by this organization. In addition to a number of interesting papers, the various committees met and recommended a number of improvements and changes in specications that will maintain the progressive course outlined several years ago by the Institute.

THE concept that a low nitrogen-reduction ratio is a favorable indication of source beds, and a high ratio an unfavorable indication, as brought out by previous reports of the American Petroleum Institute Research Project on Source Beds, is supported by a recent study of 3300 samples from the East Texas Basin. Therefore, the relationship has been found thus far to prevail in three oil regions: the Rocky Mountains, the Mid-Continent and the East Texas basin. The chances now seem good that the nitrogen-reduction ratio may turn out to be a useful means of segregating sediments that are more likely to be source beds. **Page 60.**

THE largest display of oil field equipment was opened to the industry May 16, when gates at the Ninth International Petroleum Exposition swung open. Millions of tons of heavy equipment, 85 percent of which is in operation, and delicate gadgets the size of a human hand were on exhibit. A number of special events, and several engineering society meetings, are proving of additional interest. **Page 43.**

ALTHOUGH Louisiana's steadily rising production is darkening the oil picture, some encouragement was given late last week with regard to crude oil production control. On May 15 the Texas Railroad Commission issued a poration order that was in the nature of an emergency measure. The order will reduce Texas crude production about 50,000 barrels daily effective May 20, when the state allowable will be lowered to 1,143,995 barrels daily. The commission took this action partially in response to assertions at last week's statewide hearing that lower allowables were needed to prevent a disorderly situation in the industry. **Page 43.**

SALIENT points in rotary drilling are the bit or cutting tool, the weight to be carried, the weight to be carried on the bit, rotating speeds, and mud-laden fluids. Each of the four factors is controlled definitely or influenced by the others; and, in order to obtain maximum economy and efficiency in any drilling operation, it is absolutely essential that all of them be applied in their proper balanced values. These values must be learned. **Page 71.**

LIFE of equipment in backside hook-ups and rod lines depend to a great extent on accuracy of alignment and careful attention to details in the original installations; on proper balancing of loads on the unit; reduction of friction as much as possible; and occasional inspection to see that alignment is maintained. It will depend largely, also, upon a proper rod line intallation. **Page 105.**

A RECORD-BREAKING production of crude oil in the United States during March is reported by the Bureau of Mines. The output was 90,568,000 barrels, which is 2,921,500 barrels daily, an increase of 90,000 barrels per day over the previous month. Every state except California showed an increase. The peak production, combined with a decline in runs to stills, caused crude stocks to increase for the first time in nearly a year. Daily average demand was 11 percent higher than during 1935. Exports of motor fuel declined to the lowest figure in months.

POLITICAL highlights of the week: Secretary Hull in pointing out that the move for more oil tariff is contrary to the State Department's policy of lowering tariffs, brings up a hearing on the Disney bill that has been in a pigeon hole. The observations of Representative Pettengill while a member of the Cole committee which investigated oil some months ago, have brought forth a book whose title "Hot Oil" should help its sale within and without the industry. (Page 38). And then Louisiana gets a new governor whose promise is Long policies with softer gloves, and the peace at Rodessa that was in prospect goes glimmering with opening of wells under a special order. **Page 44.**

UNITED STATES crude oil production soared last week to a new all-time peak, averaging 2,993,425 barrels daily. The previous peak, as reported by the American Petroleum Institute, was 2,965,400 barrels daily, established in the week ended September 14, 1929.

Last week's output was 61,850 barrels a day higher than the previous week's output, and 167,125 barrels daily above the Bureau of Mines recommendation.

Thus the high production is a matter for anxiety because of embodying excessive output, although it also reflects the fact that petroleum consumption is running this year at all time record proportions. Last week all of the five leading producing states were above the federal allocations. **Page 169.**

The Oil Man's Calendar

MAY 16–23	International Petroleum Exposition and Congress, Tulsa, Oklahoma.
19	National Association of Purchasing Agents, Tulsa, Oklahoma.
21	Independent Petroleum Association, Tulsa, Oklahoma.
22	National Stripper Well Association, Tulsa, Oklahoma.
29–31	National Oil Scouts Association, Annual Meeting, Baker Hotel, Dallas, Texas.
JUNE 4– 5	American Petroleum Institute, Division of Production, Eastern District, Wm. Penn Hotel, Pittsburgh, Pennsylvania.
17–20	American Society of Mechanical Engineers, Dallas, Texas.
18–19	Pennsylvania Grade Crude Oil Association, State College, Pennsylvania.
JULY 31	Interstate Oil Compact Commission, Dallas, Texas.
NOV. 9–12	American Petroleum Institute, 17th Annual Meeting, Chicago, Illinois.

Contradictory Policy

DISNEY BILL REVIVED BY STATE DEPARTMENT NOTICE

WASHINGTON, May 15.

ALLEGATIONS that the Roosevelt Administration is pursuing contradictory policies and that the tariff-cutting program of the State Department is in conflict with the President's efforts in other directions to improve the industrial situation are expected to be aired next week before members of the House ways and means committee, which will hold public hearings on the Disney Bill for the limitation of oil imports, on May 18.

Determination to hold hearings was announced by the committee this week following receipt by Chairman Doughton of a letter from Secretary of State Cordell Hull, opposing the measure as in conflict with his policy of tariff trading, to which Representative Disney filed a sharp response.

With the session of Congress due to end in three or four weeks, there is little likelihood that the legislation can be acted upon this year, but hearings were sought by the Oklahoma congressman as a means of bringing the bill out of the obscurity in which it has rested since its introduction last January.

While agreeing with the Secretary that the legislation could be so worded as to avoid conflict with existing or future treaties with foreign countries, Representative Disney differed sharply with the head of the State Department on every one of the 12 objections which the latter raised to the bill, and pointed out that a decided difference of opinion as to its desirability exists between Secretary Hull and Secretary of the Interior Harold L. Ickes and, to considerable extent, the President's National Resources Board.

Objects to Quotas

The major objection voiced by the Secretary was that the bill was in conflict with the policy of the administration to reduce tariffs, but he also contended that it is inadvisable to impose duties on commodities of which imports are small compared to domestic production or where exports considerably exceed imports.

The State Department also objects to quotas for imports, he said, and it was held that restrictions would not benefit the petroleum industry while their granting might lead other industries to seek similar legislation.

Existence of a "satisfactory market equilibrium and price improvement due to interstate and voluntary agreement" was seen by the Secretary, who also declared that imports already have been reduced as a result of the existing excise taxes, which the bill would double.

Not only would there be difficulty in the administration of import quotas, Secretary Hull contended, but importation of foreign products aids in the conservation of our domestic resources. The proposed repeal of the exemption of bunker oil from the tax was disapproved by the department, which also called attention to objections to the legislation which have already been lodged by the diplomatic representatives of France and The Netherlands.

"The policy expressed by the Secretary of State is emphatically opposed to the recommendations made by departments and agencies of the present administration which have been directly charged with responsibilities toward the petroleum industry," Congressman Disney declared in his brief in answer to the department's objections.

Imports of only a small percentage of the domestic production may be sufficient to break the price structure, he pointed out, while the Secretary's point that we export more than we import does not affect the situation because the character of our oil exports differs from that of our imports.

"The program of tariff reduction is only one of many policies to which the present administration is definitely committed," Disney asserted. "Among others are the promotion of American industry, national industrial recovery, employment of American workers and a stimulation of our consuming power which involves our purchasing power.

"Quotas are in common use by most governments in order to protect themselves and their own interests. Other countries seem to be establishing higher walls against the importation of our petroleum products as part of their policy of becoming self-sufficient in the production of motor fuel, both as a peace-time and a war-time measure.

"The possible inadvertent admission made in the Secretary's letter to the effect that similar action might be requested by many other branches of American production which feel themselves subject to some measure of foreign competition illustrates the serious situation in which much American business finds itself today in its attempt to give employment to labor at the very time that its markets are being taken by foreign products produced by poorly paid workers," he charged.

"That there is a 'satisfactory market equilibrium and price improvement' as being due to interstate and voluntary agreement," Mr. Disney asserted, "is not accepted by those in the petroleum industry who have long been discussing the reasons for the failure of petroleum and its products to hold their place in the commodity lists."

Answering the Secretary's contention that the importation of oil products tends to conserve our own resources, the Oklahoma Congressman declared that experience had proven the reverse and that "when the importation of foreign petroleum is controlled and limited, then the domestic petroleum industry is not forced to sell its product much below a proper price. When, however, large importations reduce that price," he pointed out, "then, as history shows, the domestic producer in order to raise funds necessary to meet fixed charges and financial obligations increases his own production, endeavoring thus to obtain the sums required. This has resulted in tremendous waste of an irreplaceable natural resource.

[*Continued on page 171*]

"Hot Oil"

CONGRESSIONAL INVESTIGATOR PUBLISHES FINDINGS IN BOOK

WASHINGTON.

CONGRESSIONAL investigations of the oil industry and the effort at federal control are summarized by Representative Samuel B. Pettengill of Indiana in a book entitled "Hot Oil," issued this week by the Economic Forum, New York.

A member of the committee on interstate and foreign commerce, which handles petroleum legislation for the House of Representatives, as well as of the Cole committee which in 1934 and 1935 made an extensive study of the industry, Congressman Pettengill reviews in his book the information regarding the operations of the industry and the efforts at federal control during the past few years.

Posing the question, "Will bureaucracy in destroying liberty also destroy the efficiency in the production and distribution of wealth which alone makes security possible?", the book raises for discussion the whole question of individual liberty, the struggle between federal control and states rights and the new philosophy of liberty and security through nationalization.

In addition to giving a "case study of the oil industry," "Hot Oil" presents the views of a number of outstanding men, including President Roosevelt, Governor Landon of Kansas, who may be the republican candidate for the presidency, Supreme Court Chief Justice Charles Evans Hughes, Walter Teagle, Harry F. Sinclair, and William Green, president of the American Federation of Labor.

Seeking Economies

"PRODUCTIVITY INDEX" STUDY OCCUPIES A. P. I. SESSION

By WARREN L. BAKER, Editor

TULSA.

THE Sixth Mid-Year Meeting of the American Petroleum Institute, held here May 12 to 15, was attended by a large number of field engineers, technologists and executives from all parts of the country. The group sessions, which were featured by discussions on drilling and production practices, marked the beginning of the formal program, after two days devoted to series of committee meetings.

Subjects that occasioned wide interest at the group sessions were Productivity Index, Bottom-Hole Pressure Determination, Pressure Drilling Control Method of Rotary Drilling, and the Improvement of Drilling and Production Equipment. It was emphasized that necessity for competitive production methods by operators and the installation of oversize equipment would be eliminated by use of the productivity index, which is the true index of all oil wells ability to produce.

The general opinion prevailed that great strides have been made by investigators along individual lines of advance. Due to incomplete coverage and some contradictory evidence, few definite recommendations were made as to specific practices. Investigative work is to be continued and will be based on results of data made available by the experimental work completed over the past two years.

Recording Pressure Gauges

"Use of Recording Pressure Gauges" was the subject of a paper by R. S. Christie and was presented before the production division Thursday. The author defined the drill stem test, emphasizing the importance of obtaining a pressure record while making this test, and he discussed at length the interpretation of records so obtained.

Primarily, the purpose of the drill stem test is to determine whether a formation contains gas, oil or water. An analysis of the recorded pressures after a run indicates whether the test was proper, if water shut-off was complete, and to some extent indicates the capacity of the well to produce, whether it be water, oil or gas. While running the gauge a pressure gradient of the drilling fluid is also obtained. This constitutes a graphic picture of the condition of the drilling fluid. Christie concluded with the thought that the use of pressure gauges for such study would follow the general trend of technical advancement and would become a standard practice.

Marvin Cook's paper on "Welded Joints for Oil-Well Casing," presented at the Thursday meeting of the production division, was received with interest. He pointed out that the safe depth for setting casing of large diameter has in the past been determined by the collapse rather than the joint strength of the tube. The development of deeper drilling established a trend toward the use of casing of smaller diameter, the safe depth of which is limited by the joint rather than the collapse strength. This condition will permit use of a thinner wall to resist collapse, but in turn it will require a joint of higher efficiency in tension than previously used.

The necessity for better joints was further substantiated by citing instances where strings set at near 9000 feet and under internal pressures of 3000 pounds allowed considerable coupling leakage. In order to overcome these adverse conditions, the welded joint was suggested. Although in experience and perfection such technique has not advanced to a position where it is economically and practically advantageous, Cook believed that its development should be further encouraged.

An interesting paper presented Friday was "Nickel-Alloy Steels in Drilling Equipment," by Albert G. Zima, International Nickel Company, Los Angeles. Concise descriptions, with tables of physical properties, were given of the alloy steels used in the manufacture of drilling equipment, such as bits, drill collars, kellys, tool joints, chains, draw works, blocks, swivels, pumps and other items, including control fittings and sucker rods.

Bottom Hole Pressure

"A Precision Gauge for Sub-Surface Pressure Measurements," a paper by Paul G. Exline, Gulf Research & Development Corporation, was well received at the general session May 15. It was shown that during the past few years the bottom-hole pressure gauge has become a necessary part of oil producing equipment. Use of bottom hole pressure data as a guide is of great value in determining the proper time for the installation of pumping equipment, thus permitting an orderly

Producers Hold Key

TO THE IMMEDIATE FUTURE OF INDUSTRY--BYLES

TULSA.

AXTELL J. BYLES, president of the American Petroleum Institute, who attended the Sixth Mid-Year Meeting of the organization in Tulsa last week, believes that crude oil producers now hold the key to the immediate future of the industry.

Byles' statement follows:

"They (producers) may hurt the entire industry, and themselves, by continuing to crowd production allowables to the limit. They may help the entire industry, and again themselves, by slowing up production sufficiently to permit the rest of the industry to liquidate surplus stocks, particularly of gasoline.

"The severe weather of last winter necessitated heavy production of fuel oil at petroleum refineries, and, concurrently, abnormally large production of gasoline. While the weather encouraged fuel oil consumption, it discouraged gasoline demand by preventing the general operation of motor vehicles. As a result, refiners face the spring and summer motoring season with unnecessarily large stocks of gasoline.

"The first quarter of 1936 revealed an increase in gasoline demand of about 9 percent above that of the first quarter of 1935. Indications are that second quarter gasoline demand will be about 6 percent above that of second quarter of 1935. However, gasoline demand was abnormally heavy in 1935 and even the expected increases in motor vehicle registration and use this year probably will not be sufficient to assure gasoline consumption throughout the rest of 1936 at the same high rate as the first and second quarters.

"A little foresight on the part of producers and a slight curtailment of crude oil output at the present time would tend to improve the situation later and obviate the usual effects of forcing too much crude oil upon the market. Also, a reduction by refiners of crude runs to stills would be helpful.

"Generally speaking, the industry is in a better position as regards earnings than in some years. While the industry is not even yet getting as large a financial return from its investment and services as is the tax collector, many companies are showing favorable earnings reports.

"Employment continues to gain, especially in the refining branch of the industry, where the number of workers is nearly at 1929 levels, and average weekly wages are above 1929 levels. The industry is contributing substantially to the restoration of general trade activity by continuing its heavy purchases of the products of other industries.

"Uncertainty as to future trends in taxation and legislation still exerts a discouraging influence upon essential planning for the future."

program of installation to be planned in advance. Depreciation, investment interest, and obsolescence of idle pumping equipment can all be reduced in this way, it was pointed out. The bottom hole pressure gauge can be used not only to show when a field is being produced and operated at maximum efficiency, but pressure contouring a field will yield much information on the reservoir structure itself, the paper stated.

Other papers presented at the Thursday and Friday general sessions were: "Economic Life of Sucker Rods," by Emory Kemler, Gulf Oil Corporation; "Back-Side Crank Pumping and Catenary Rod Lines," by R. E. Bridges, Humble Oil & Refining Company; "Application of Multi-Cylinder Gas Engines," by D. G. Kingman, General Petroleum Corporation of California; "Rotary Drilling Practices," by J. E. Brantly, Drilling & Exploration Company; "Pressure Completion of Wells in the Fitts Pool," by K. R. Teis, E. H. Moore, Incorporated; "Productivity Index," by M. L. Heider, The Carter Oil Company; "Degree of Reduction of Sediments in the East Texas Basin as an Index of Source Beds," by Parker D. Trask, U. S. Geological Survey.

A feature of the committee meetings Wednesday, May 13, was a joint session of the topical committee on drilling practice and the topical committee on production practice. After considerable discussion members decided not to recommend a change in the method of determining the viscosity of mud fluid in the field. The corrosion fatigue of drill pipe was discussed from several angles. The effect of the action of various mud fluids on drill pipe was recognized as important.

Several drilling contractors and a number of operators urged the adoption of a standard drilling form for drilling contractors. It was shown that companies do not agree on certain provisions or the amount of work to be included with a contract. Such items as coring, fishing and various hazards represent a real problem, since situations constantly arising are not mentioned in a loosely drawn contract. The lack of uniformity of contracts often leads to trouble between the contractor and the operator. In view of the fact that drilling sometimes starts ahead of signing the contract, friction may arise from all types of misunderstandings. The cable tool contractors from the East doubted the feasibility of a single contract form.

Productivity Index

Discussion on production practice followed the part of the meeting devoted to drilling practice. The productivity index was a featured subject and no agreement was reached concerning its application to various fields. Theoretically, the members agreed that it would be possible to substitute the productivity index for the open flow test, but from a more practical standpoint the change cannot be made. In the Fitts pool the productivity index method was tried, but because of the existence of a gas cap that prevented determination of the true bottom hole pressure, the method was not applicable. The method looks promising because it is based on the ability of a well to produce ,but the mechanics of the practice gives considerable trouble.

At Fitts fully eight hours were required to obtain a point of stability or equilibrium in a well during tests when determining the productivity index. Only three points on the curve could be obtained in 24 hours, making the method very slow and expensive. In California, pressures, viscosity of oil, water cut and salinity of water have been considered during the productivity index tests, but the problem has not been solved and the method is considered in the experimental stage.

A few companies have been attempting to apply the productivity index to pumping wells, a new practice. It is known that the pressure drop in low pressure pumping wells is appreciable when they are produced at a maximum rate. The productivity index is based on the action of a well during various rates of flow.

During the discussion it was disclosed that pressures at Kettleman Hills are dropping so rapidly that it is necessary to plan for some type of mechanical lifts. Gas lift has been used for some time, but possibility of deep pumping equipment is being seriously considered by one operator. The fluid level at Kettleman Hills may be high enough to permit use of such deep pumping equipment as is used at Oklahoma City and Santa Fe Springs. The average bottom hole pressure at Kettleman Hills is so low that many edge wells are barely flowing their allowables.

The special study committee on well spacing met Wednesday, May 13, and made a number of definite recommendations that would affect field development. The special committee reported that the well spacing question is a technical, economic and political one, and each phase must be considered in any field. The rate of withdrawal, permeability of the producing sand and local environment enter into the question, it was shown.

During the discussion on well spacing, one member stated that in Iraq 12 wells on a structure 10 miles wide and 60 miles long are regarded as a sufficient number to satisfy production requirements for 25 years. These wells are producing from a cavernous lime-

Technical Progress

TRADE MEETINGS INDICATE EFFORT FOR ADVANCEMENT

TULSA.

THE Sixth Mid-Year meeting of the American Petroleum Institute, the International Petroleum Exposition, and other gatherings of oil men during the coming months are seen by W. R. Boyd, Jr., executive vice president of the American Petroleum Institute, as indicative of the unending effort of the American petroleum industry to improve its operations, products, and service to the public.

"Few people realize how rapidly this young industry has progressed, especially within the past few years," Boyd continued. "The public frequently hears warnings of an impending shortage of petroleum. It hears reports of enormous waste of the nation's petroleum reserves. But it seldom hears of the work constantly being done by this industry, through the activities of individual companies, of technologists, of trade and technical organizations, to prolong the nation's supply of petroleum, to eliminate waste, to improve the quality and the usefulness of petroleum products, and to make operating methods efficient to a degree which permits of attainment of all these highly desirable objectives.

"From just such meetings as the Institute now is holding have come such factors for progress as knowledge of the methods of utilizing natural gas to prolong the productive life of oil fields and to increase the ultimate recovery of oil. From these meetings have come also developments in technique which made straight-hole drilling a possibility, improvements in machinery and methods which assure oil and gas wells being brought in under control and without waste, and other forward steps which have been of practical value in eliminating waste of natural resources.

"From just such meetings have come miraculously rapid developments in the science of petroleum refining. Among them are flexibility of refinery operation to permit manufacture in quantity of those products for which demand is greatest without causing waste of other products, improved equipment and methods which reduce operating losses to the minimum, and new refining processes which tend indefinitely to postpone even the possibility of a day of oil shortage.

"All this progress has been, and is being, made; all these favorable developments are coming about, not by legislation or by compulsion, but because of the well-directed work and energy of an inherently progressive industry. There is every reason to believe that this industry, if permitted to do so, will continue to make such progress, and every reason to believe also that its accomplishments largely will be in the public welfare.

"It would be most helpful to this industry if all forms of government should limit attempts at direction of industrial undertakings to those fields in which the influence of economics, and of the industry itself, is handicapped by lack of authority or of necessary facilities. There is much which government can do which will be helpful both to industry and to the general public, and which will be adverse to neither. With such efforts this industry is largely in sympathy, and is prepared to give loyal support."

stone. In the Oklahoma City field, wells with a bottom hole pressure of 100 pounds are producing more than 2000 barrels of fluid, a condition that illustrates the porosity of the producing sand in this field.

The topical committee on production technology discussed bottom hole pressure determination, permeability, and related subjects at the Wednesday meeting. Much of the information which was of general interest is only the result of primary investigation. Although definite strides have been made along individual lines, considerably more investigation is necessary before available data may be correlated to form a basis of procedure.

The fact that every area has individual problems in bottom-hole information, pressures, water, cores, and other physical factors made necessary the recommendation that the experiments and data be representative of a greater period of time, and that they involve as great a variance of conditions as possible. The subjects discussed occasioned considerable interest, and the meeting was one of the best attended of the day.

Determining Porosity

Certain phases of the subject, particularly with reference to the determination of porosity of a given sand, were considered as having a direct though unacknowledged bearing upon the well potential. A definite distinction was made between the total porosity of a core and the effective porosity, the former being considered as the volume of all space occasioned by the pores of the formation, and the effective porosity as that volume of space through which oil or gas might be produced, but not including that space which is enclosed so that it is without effect upon production. Distinction will be made in the future as to proper designation of sand porosity.

Various saturation methods, manners of determining porosity, and the accuracy of pressure recording instruments were discussed and compared. It was agreed that considerable advance had been made in methods and laboratory practices, and that with more complete field information it would be advisable to formulate and encourage the adoption of definite procedure.

Pipe Line Corrosion

The topical committee on corrosion of pipe lines, which met Thursday morning, agreed that the last two years study of cathodic protection of pipe lines did not allow the drawing of definite conclusions. Further study and the expression of individuals working with the subject were requested and encouraged. Interesting data, however, was presented in pipe line maintenance costs and control through the application of cathodic protection. Considerable work along this line is at present being done in California, and it was admitted that the average cost per mile of protected line was in the neighborhood of $2000, this figure including windmill power installations and coatings.

A brief study of a 50-mile, 22-inch line in Louisiana established that the occurrance of pits were regular in frequency, either with or without any protection whatsoever. If graphed, such pit frequency would follow an increasing frequency with time; but with protection, the curve of the line would immediately alter and result in almost a straight line in regard to time, from the maximum occurrence. Consequently, leakage resulting from pitting may be expected to occur with regular frequency.

Due to the increased use of thin-walled line pipe, the practice of total covering has grown. Various companies have developed their own coatings for this and general purposes, and manufacturers have lately developed new formulae for specific requirements.

It was the experience of some engineers that hot spot determination was only accurate to a very limited extent, and that the expense might not be justified in view of the fact that it is frequently necessary to make joint or other replacements at intervals. In one instance, not more than 50 percent of the hot spots determined by tests proved injurious, and other areas that were determined as being negative were later found to be hot.

It was agreed that a pit developing in from one to three years definitely denoted a hot spot, but that a pit of the same size developing in 14 years would not necessarily condemn an area as being hot. In a case discussed, eight miles of line were uncovered and it was found that corrosion was occurring both at points where the line was picking up current and at points where it was giving it off.

The expressed opinion of one was that it is better to await hot spot development rather than to maintain a full inspection of the line. Attacking the problem from this angle it was believed would allow uninterrupted line service for a number of years.

The subject of mill scale was mentioned, and it was agreed that a period of from one to three months of weathering would allow mill scale that might later cause trouble to loosen. In this weathered condition it could easily be cleaned from the pipe, and other mill scale that did not loosen after this period of weathering was acting as a varnish and would probably aid in the protection of the metal.

Drilling Practice

Two committee meetings on rotary drilling equipment and practices, held Wednesday, covered questions pertinent to modern procedure and specifications. Of particular interest was the subject of tool joint makeup, and the opinion prevailed that a considerably closer makeup was much to be desired. It was pointed out that in deep drilling much of the pressure exerted to the mud column to obtain a sufficient velocity for operation is lost in the friction generated through lack of closely fitted joints, or through the resistance built up by eddies of the fluid.

The result of this space is a tendency to create a greater pressure than would otherwise be required for efficient operation. Energy applied to the fluid is transposed from velocity to pressure by resistance. Also, in the swabbing of deep wells, it was pointed out that in many cases the cups are turned inside out when caught in recesses in tool joints, and that the expense of successfully swabbing a deep well is frequently prohibitive. Definite standards

Decry Discrimination

A. P. I. DIRECTORS SPEAK ON TAX AND DILUTION ILLS

TULSA.

DIRECTORS of the American Petroleum Institute convened twice during the Sixth Mid-Year Meeting in Tulsa last week, and passed resolutions denouncing discriminatory taxes and legislation and endorsing highway safety efforts. Discriminatory taxes and legislation imposed upon one industry and its customers for the benefit of another industry were termed as being opposed to public welfare. The resolution, which made specific mention of no proposed taxes or legislation, but which was adopted after discussion of proposals to impose a tax upon fuel oil to minimize the competition with coal and to compel motorists to use as motor fuel a blend of alcohol and gasoline. Declared that attempts to eliminate or to equalize competition by uneconomic forms of taxation and legislation "constitute indefensible discrimination as between industries and are violative both of business ethics and American tradition.

"Free competition among industries," read the resolution, which was adopted unanimously, "if unhampered by legislation designed to promote the welfare of one industry at the expense of another, will assure the public both of its right to enjoy the greatest possible industrial service at the least possible cost and of its privilege to use and to enjoy the benefits of progress in any line of industrial endeavor as soon as they are available."

The industry was called upon by the directors of the institute to assist in the promotion of highway safety in another resolution. The industry was urged to encourage the motoring public to observe and to apply safe-driving principles and to make full use of facilities available at service stations for maintaining motor vehicles in safe-operating condition. The industry was asked also to urge government to expend all revenues obtained from special additional motor-vehicle levies, such as gasoline taxes, exclusively for the stated purpose of highway financing.

and clearances were proposed and accepted.

During the discussion it was brought out that joint failures often were due to faulty thread tapers. The taper tolerance is ordinarily too great, one member claimed. An operator stated that tests showed that tubing was subjected to uses for which it was not designed, and further stated that tubing joints are nothing more than glorified line pipe couplings. The same operator made extensive tests and found that drill pipe joints were effective and fully up to standard, casing couplings were fair, but that tubing couplings did not give the results expected. The recommendation called for improved tubing and pipe couplings.

Sub-Committee Meetings

Other committee meetings held May 12, 13, 14 and 15 included the manufacturers' sub-committee on belting, A. B. Merrill, chairman; steel derrick manufacturers' sub-committee, R. R. Bloss, chairman; sub-committee on standardization of production valves, E. Stanley Durward, chairman; manufacturers' sub-committee on rotary drilling equipment, J. M. Shimer, chairman; special sub-committee of oil well pump manufacturers, M. T. Archer, chairman; subcommittee on measuring, sampling and testing natural gas, George P. Bunn, chairman; special sub-committee on centrifuge tubes, O. D. Stallard, chairman; topical committee on materials, C. W. Froome, chairman; committee on accident prevention in production, R. E. Donovan, chairman; engineers' sub-committee on belting, D. L. Trax, chairman; engineers' sub-committee on rotary drilling equipment, C. W. Froome, chairman; special sub-committee on standardization of valves and fittings, A. D. Sanderson, chairman; program committee on drilling and production practice, B. B. Westcott, chairman; joint meeting of engineers' and manufacturers' sub-committee on belting, D. L. Trax and A. B. Merrill, chairmen; joint meeting engineers' and manufacturers' sub-committee on steel derricks, Hu M. Harris and R. R. Bloss, chairmen; engineers' sub-committee, J. L. Glennon, chairman; committee on standardization of standard rigs and derricks, W. H. Meier, chairman; engineering sub-committee on casing, drill pipe and tubing, M. E. Schwarz, chairman; joint meeting engineers' and manufacturers' sub-committee on rotary drilling equipment, C. W. Froome and J. M. Shimer, chairmen; committee on standardization of pumping equipment and engines, T. E. Swigart, chairman; joint meeting bolted tank manufacturers sub-committee and standing committee on accident prevention in production, William Schwemlein and R. E. Donovan, chairmen; central committee on measuring, sampling and testing natural gas and natural gasoline, F. E. Rice, chairman; sub-committee on determination of actual evaporation and other pipe line losses, R. O. Dietler, chairman; central power committee, O. D. Donnell chairman; committee on uniform methods of oil accounting, F. S. Reitzel, chairman; sub-committee on car service, J. M. O'Day, chairman; committee on testing methods and specifications, K. G. Mackenzie, chairman; engineers sub-committee on tanks, W. M. Giffen, chairman; committee on railroad transportation, Fayette B. Dow, chairman; committee on standardization of oil country tubular goods, John R. Suman, chairman; committee on standardization of rotary drilling equipment, E. J. Nicklos, chairman; committee on standardization of steel tanks for oil storage, W. M. Giffen, chairman; central committee on district activities, W. H. Meier, chairman; conference sub-committee on longitudinal use of railroad property, G. M. Davidson, chairman; central committee on standardization of oil field equipment, J. Edgar Pew, chairman; program committee on drilling and production practice (dinner meeting), B. B. Westcott, chairman; division of production, general committee, George A. Hill, chairman; and central committee on drilling, T. V. Moore, chairman.

Re-Elect Officers

ALL GASOLINE ASSOCIATION OFFICIALS TO SERVE AGAIN

ALL officials and directors of the Natural Gasoline Association of America were reelected at the Fifteenth Annual Meeting of the association at the final session Friday afternoon, May 15, in Tulsa. T. R. Goebel, Skelly Oil Company, Tulsa, will continue as president of the association for the next year. The three reelected vice presidents as are follows: W. E. Reardon, Columbian Gasoline Corporation, Monroe, Louisiana; Fred F. Ketchum, Owens, Libbey-Owens, Gas Department; and R. E. Haylett, Union Oil Company of California, Los Angeles.

Directors reelected for a new two-year term include the following companies and their representatives; R. E. Beckley, Standard Gasoline Company of California, C. E. Brock, The Peoples Ice & Fuel Company; D. E. Buchanan, Hanlon-Buchanan, Inc.; D. B. Dow, Indian Territory Illuminating Oil Company; T. R. Goebel, Skelly Oil Company; R. H. Hargrove, United Gas Public Service Company; J. A. LaFortune, Warren Petroleum Company; F. E. Rice, Phillips Petroleum Company and O. H. Schoenwald, L. H. Wentz, Oil Division.

Directors whose terms expire next June, 1937, and who are now serving the second year of their terms are: R. A. Carter, Continental Oil Company; F. L. Chase, Lone Star Gasoline Company; R. E. Cornwell, Carbide & Carbon Chemical Corporation; R. E. Haylett, Union Oil Company of California; L. B. Jackson, Oklahoma Gasoline Plants, Inc.; Fred F. Ketchum, Owens, Libbey-Owens, Gas Department; W. B. Moran, J. E. Crosbie, Inc.; R. N. Parks, Virginian Gasoline & Oil Company; E. L. Peck, Empire Oil & Refining Company; W. E. Rearden, Columbian Gasoline Corporation; Chas. F. Roeser, Roeser & Pendleton, Inc., and S. S. Smith, Shell Petroleum Corporation.

The Natural Gasoline Association of America at the opening session of its fifteenth annual meeting, Tulsa, was addressed by H. T. Ashton, Lubrite division of the Socony-Vacuum Oil Company. He was introduced by A. V. Bourque, secretary Western Petroleum Refiners Association and first secretary of the Natural Gasoline Association. Ashton, one of the organizers of the association traced the history of association growth and development in conjunction with the rapid growth and development of the natural gasoline industry. He delivered a comprehensive review and urged the present membership to continue with the work it is doing as a unit in striving to better conditions for both the natural gasoline and petroleum refining industries.

T. R. Goebel, Skelly Oil Company, and president of the association in his annual address expressed confidence and optimism regarding the future of the gasoline industry and its association. He stated "We have come through the doldrums of the depression in fine shape, and I am certain that the prolbems facing us at present do not seem so insurmountable as they did seem just a year ago. Many of the complexities of the industry seem to be on their way to satisfactory conclusion. The progress made has been such as to make the outlook most favorable. He stated that the natural gasoline industry was unique in that it is both a production unit and a conservation unit.

The following sessions of the convention were devoted to the reading and discussion of a group of important technical and economic papers dealing directly with the problems of the natural gasoline manufacturing industry.

Lane Heads Supply Men

The Natural Gasoline Supply Men's Association at its annual meeting, Wednesday, May 13, elected G. B. Lane of The Foxboro Company as its new president. He succeeds J. A. Lupfer, Worthington Machinery Corporation of Oklahoma. Other officers elected were D. W. McKay, Cooper-Bessemer Corporation, first vice president; D. E. Fields, Tulsa Boiler and Machinery Company, second vice president; W. D. Moorer, Moorlane Company, treasurer and Wm. F. Lowe, secretary of the Natural Gasoline Association of America continues to serve in the same capacity to the supply group.

New directors elected to serve a two-year term beginning June 1, 1936, are as follows: D. E. Fields, Tulsa Boiler and Machinery Company, Tulsa; V. C. Cantor, Frick-Reid Supply Corporation, Tulsa; George F. Probst, Clark Brothers Company, Tulsa. These, together with the following, whose terms expire June 1, 1937, comprise the board of directors for the coming fiscal year: G. B. Lane, Foxboro Company; D. W. McKay, Cooper-Bessemer Corporation; W. D. Moorer, Moorlane Company; W. W. Woobank, Woobank Pump & Machinery Company, and W. A. Schleuter, Refining Supply Company.

Largest Show Opens

INTERNATIONAL EXPOSITION FAR AHEAD OF OTHER YEARS

TULSA.

WHAT the equipment maker has for the equipment buyer went on display May 16 with the opening of the ninth International Petroleum Exposition. For 8 days the men of the petroleum industry are to indulge in what the industry has come to know as "The Oil Show." Its management has designated it as the leading industrial show of the nation.

For the most part the equipment is either new or improved. It runs the gamut from the latest Diesel-powered rig to the delicate gadgets by which scientists keep abreast of temperatures, viscosities and weights of the products that come out of a barrel of crude oil. Along with production and refining equipment, transportation has its displays. Marketing also is represented by the latest devices for selling finished products and providing the services that have become a part of service station routine.

West Virginia and Pennsylvania, oldest of the oil producing states, drew first honors by having the opening day designated in their honor. Titusville, Bradford, Oil City, Sistersville and Clarksburg were the cities honored on the opening day. The day was further designated as belonging to the refining division of the industry. W. G. Skelly, president of the exposition, was the director chosen to play host for the day.

The opening ceremony was in charge of the American Legion. The address was given by W. A. Irvin, New York, president of the United States Steel Corporation.

By days the full period of the exposition will follow that pattern. Each one will be in honor of some division of the industry, with states and cities designated for each day. Some director will be host for each day and a group from the board of directors will serve for each day. A band concert each afternoon will remark entertainment each day.

Special events, some of them repetitions from other years, include selection of the Grand Old Man of the Industry, the safety meet, luncheon in honor of foreign delegates, trips through refining plants and into the fields under development in Oklahoma, the exposition golf tournament, demonstrations of extinguishing oil well fires and demonstrations of the use of geophysical instruments in the field.

The opening of the exposition followed the sixth annual Mid-Year Meeting of the American Petroleum Institute here May 12, 13, 14 and 15. The annual convention of the Natural Gasoline Association of America was held here May 13 and 14. May 21 the Independent Petroleum Association of America will meet in Tulsa. Directors will have a meeting and luncheon at noon, while the annual banquet will be held that evening. There will be a conference on safety May 21 in the Tulsa hotel. The safety delegates will make a tour of the exposition the following day.

Diversion as fostered by the exposition will be restricted to the annual golf tournament. The first round will be played May 20 on the course of the Tulsa Country Club. Final rounds will be played May 22. Frank Gray is chairman of the tournament. The safety contest will be held that afternoon and the banquet will be held that evening when awards will be made.

Efforts to pay tribute to veterans of the industry started with the holding of the earlier expositions. These have been growing in scope each year. This year a ceremony in their honor will be held May 17 with the Reverend Guy Tetirick as chairman. Medals in recognition of long service in the industry will be awarded May 21 at the exposition grounds.

The management of the exposition is fostering a memorial to the pioneers of the industry. Artists, sculptors, architects, teachers and students have been asked to submit plans for a suitable memorial. A committee headed by Glenver McConnell will determine which suggestion best suits the ideas of the committee. The contest opens May 16 and will continue through September 1. An award in money will go to the three who submit the best plans.

Rules are that the plans submitted must be such that the memorial can be constructed for a cost not to exceed $24,000 and one that can be built in units not to cost more than $5,000 each, although the first expenditure may run as high as $10,000. The rules do not restrict the contestants as what the memorial shall be, although it is hoped that something will be submitted which will fit into the general scheme of the industry.

An improved plant was on display for the opening day. Buildings and equipment have reached an investment of $500,000. The site is owned by the exposition. In addition to the facilities provided by the management, the larger exhibitors have continued to invest larger sums in buildings and facilities for their displays. Several new buildings were erected this year.

During the week the luncheon clubs of Tulsa will make their programs coincide with exposition events. Foreign delegates will be guests of the Rotary Club, May 20. Other clubs to meet that day are American Business Club, Cooperative Club, Engineers Club, Brittlings, Lions Club, Optimist Club.

The scientific exhibit has grown to the point that all space in this building was assigned previous to the opening. One exhibit in this building is a demonstration of building highways with asphalt. Its purpose is to show that asphalts from oils of the United States are adaptable for road building purposes.

The manufacture of hydrometers and thermometers will be showed in detail, including blowing of the stem and bulb, calibration of the stems and weighing of the hydrometers in liquids of various gravities, the handwriting of the scales and finally the setting of the scales and the closing of the stems.

Permanent Buildings

Some of the larger concerns have erected permanent buildings on the exposition grounds this year. They have inaugurated a style of architecture more in keeping with the idea of an industrial world's fair. The exposition management, to keep pace with its exhibitors, has been forced to beautify its own exhibit buildings and grounds both inside and out. Even the expedition employees are dolled up in especially designed uniforms of vivid green and red.

New and ingenious mechanical methods will be found on every hand, scattered over the 20-acre site.

Texas Reduced

ORDER EFFECTIVE MAY 20 CUTS 54,000 BARRELS DAY

AUSTIN.

THE Texas Railroad Commission has issued a statewide proration order, effective May 20, reducing the Texas allowable by 54,000 barrels a day, approximately. This fixes the total allowable at 1,143,995 barrels per day, as compared with the allowable on May 13 of 1,192,530 barrels, which includes the reduction of 5600 barrels per day which the commission ordered effective in Southwest Texas on May 8.

The new order, which reduced allowables in most of the flush fields, is intended to effect a cut of 10 percent in all the proratable oil in the state. In the past commission policy has allowed wells in new fields to produce at the rate of 150 barrels per day, but the new order will allow these wells to produce only 135 barrels per day. This applies to such fields as Amelia and Talco. The Rodessa allowable, however, was continued at 350 barrels per well per day in line with the allowance made in Louisiana.

Prior to the hearing authentic sources in Austin reported that they had been

[*Continued on page 171*]

Support Conservation

NEW LOUISIANA GOVERNOR WANTS MORE OIL OUTPUT

BATON ROUGE, LA.

FULL support of the state conservation department in the administration of oil operations in Louisiana and a far-reaching revision of the laws relative to the lease of state lands is planned by Richard W. Leche, who May 12 became governor of Louisiana.

Governor Leche announces that he expects to require daily reports to the conservation department for severance tax collection receipts and that he expects the legislature to levy an additional tax on the natural gas industry.

"I propose to support the conservation department if the actions of that department are legal," the governor declared. "I don't know anything about the oil business. The conservation department has men who are trained in the oil business and I must rely upon them to administer that department."

Favors Control By State Only

The new governor made it clear that he would not favor the state's entering into any agreements which would discriminate against oil production in the state, but at the same time he asserted that he did not want the Louisiana situation to break down the price structure.

"I feel that the state in the past has not occupied its just position in the oil industry," the governor said. "For instance, Texas is now producing 1,100,000 barrels daily and Louisiana is producing about 180,000 barrels. If Louisiana's potentialities are as great as we have every reason to believe they are, we believe that Louisiana's proportion of the total oil business should be larger."

He says he is against federal control of the oil industry or any business and that belonging to the Interstate Compact might prevent Louisiana obtaining a position in the oil industry he believes the state should have.

Governor Leche was emphatic that it was not his purpose to generate or tolerate anything that might bring about a "distressed oil business" in Louisiana. He believes, however, in view of the greater cost of obtaining production in Louisiana, that to give the Louisiana producer a fair return he should have a proportionately larger production privilege.

"Unless the state permits individuals and corporations to make a fair return on their investments the state cannot expect its mineral resources to be developed," the governor said. "However, I do not want any right of production to be abused and wasteful production of oil and gas will not be tolerated."

State Lease Methods to Change

Governor Leche has announced that it is his purpose to change the method of handling oil leases by the state. Heretofore, leases have been made after receipt of competitive bids after advertising for bids on application of some individual or corporation who guarantees the state land office advertising costs. While the detail has been handled by the state land office, the final responsibility in any case is on the shoulders of the governor.

The new governor is of the opinion that the state has leased its lands in tracts too large for the state to realize the greatest return. For instance two leases signed in the last days of the life of the late Governor O. K. Allen were for in excess of a half million acres each.

"Louisiana is a state rich in mineral deposits," the governor said in an address to the people of the state just before he was inaugurated. "These deposits exist not only on privately owned land, and it is generally known and admitted that Louisiana is forging to the front rapidly in the production of oil, gas and other minerals. It is my belief that the state should receive a great deal more money from its mineral leases than it has received in the past, and I am further convinced that the present system of leasing these lands is not in the best interest of the public.

"As the law stands today, any person has a right to request the advertisement of any portion of state lands for mineral leasing. Upon the request being made, the land is advertised and it is the function of the governor to receive the bids and to accept such bid as, in his judgment, is to the best interest of the state.

"Now, suppose, for example that a certain tract is advertised and five bids are received by the governor. Suppose, too, that one of those five bids is unquestionably the best of the five, the governor is then perfectly justified, under the present law, in accepting that bid and awarding the lease, yet if the state were in a position to know the geophysics of that particular portion of land the best of those five bids might be a mere pittance. In other words, when a piece of state land is advertised it appears that everybody knows the true value of that land except the state.

"I am told that in the past certain leases have been awarded, in all cases, of course, to the best bidder, yet the

GOVERNOR RICHARD W. LECHE

successful bidder, within a comparatively short period of time, would resell that lease for many thousands of dollars more than was paid to the state. If this is true, then it appears to me that in the leasing of our state land there

[*Continued on page 50*]

Plan Appeal to Leche

THIRTEEN RODESSA WELLS WIDE OPEN WITH STATE APPROVAL

SHREVEPORT.

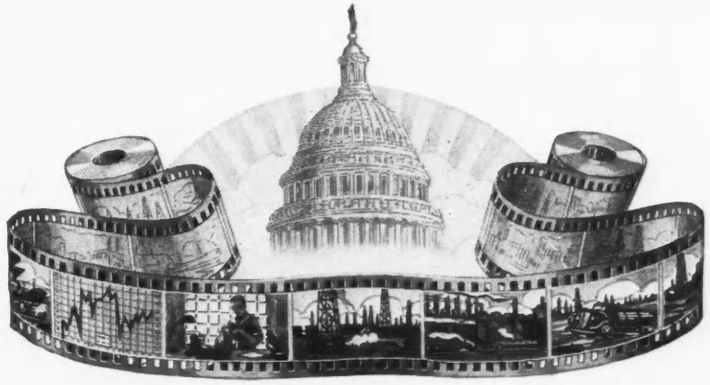
THE question of proration in the Louisiana part of the Rodessa field presents a major problem for Governor Richard Leche of Louisiana, who assumed office last week.

The question which would have been a major problem sooner or later was precipitated into an immediate issue when Pelican Oil & Gasoline Company (A. C. Glassell and associates), acting under a special allowable order given that company late in March of this year by Dr. J. A. Shaw, director of the Minerals Division, Louisiana Conservation Commission, to produce in excess of the regular 350-barrel per day allowable for Rodessa, an aggregate of 200,000 barrels in a 60-day period, reopened its 13 wells on the Sexton lease, Section 14-23n-16w, in the heart of the Louisiana side of the field. This lease comprises 120 acres.

For the first 24 hours the 13 wells were opened ending at 7 a. m. Wednes-

[*Continued on page 50*]

The Changing Panorama



THE OIL WEEKLY'S COMPOSITE VIEW OF INDUSTRY

Edited by L. J. LOGAN, Associate Editor

IT may be just a coincidence, or there may be some indirect connection. But it is a fact that the general situation in the oil industry today is remarkably like the business situation in general. In both cases, all the visible and tangible circumstances indicate that some degree of prosperity has arisen. At least to some extent, happy days are here again.

But at the same time, in both instances, there are very few souls so confident as to go around singing audibly that the happy days are back. The prosperity that exists today embodies still a lot of trepidation.

Some Doubts Linger

In the general business and industrial world, the hesitancy and deficient confidence have been evidenced unmistakably in recent weeks by the irregularity of the stock markets, in the midst of favorable industrial news and developments. Some of the traders and investors obviously were dubious of the ability of business to justify the prevailing prices of securities.

Similarly, the outlook for the oil industry was regarded a few months ago with noteworthy optimism, but subsequently the situation has become clouded by uncertainties and difficulties. There is a general disposition to view the industry's long-range future with hopefulness, if not with bullishness. But considerable anxiety prevails as to the immediate future.

Excesses Cause Anxiety

The oil industry's markets have been weak, and some observers have become afraid they will lose more ground.

The outstanding difficulty now is the existence of the excessive inventories of gasoline. So far, there has not been any noteworthy success in accelerating the usual spring withdrawals from storage, and gasoline prices have been unstable. Last week brought continued weakness of prices of both gasoline and kerosene.

In addition, there is today less assurance than formerly that crude production will be held strictly within market requirements. Louisiana threatens to throw the national production out of balance with demand, and because of that state's rapidly growing production, there are mutterings in other states. There are threats of following Louisiana's example of exceeding the Bureau of Mines recommendations.

State Cooperation Declining

Furthermore, there is agitation for abandonment of the Interstate Compact, which so far has aided materially in controlling the national crude output. In some of the states participating in the compact, there is the feeling that the badge of membership has been the insignia of the sucker. It is argued that while member states have been practicing restraint and carrying the burden of stabilizing the markets, non-member states have been overproducing and yet cashing in on the self-restraint of the members. Last fall and last winter, California, a non-member, was greatly exceeding the federal allocations. In recent months it has been Louisiana, another non-participant in the compact, that has most flagrantly disregarded the Bureau of Mines allocations.

These circumstances were back of the recent assertion of a member of the Texas Railroad Commission that the commission should increase the Texas allowables if other states do not curtail their production. The same official declared he will oppose Texas participation in a new Interstate Compact when the present one expires September 1, 1937, unless other states guarantee to observe its provisions.

Long Term Prospects Good

As indicated previously, however, today's difficulties and threats in the oil industry are more in the nature of blemishes on the immediate outlook than clouds over the long-term future. The situation appears distinctly brighter when viewed in relation to the events of past years and the promises of future years. From a long-range standpoint, it is possible to generate considerable enthusiasm over the industry's current position and possibilities.

It is gratifying, for instance, that conditions in the industry are generally better than a year ago. It is true that the gasoline stocks are not as well in line with requirements now as a year ago. Nevertheless,

prices are higher, for both crude and refined oils, and the volume of business is larger, as demand is running this year at all-time record proportions. Earnings consequently are good—the best since 1930 or 1929 for many companies, and the best on record for some concerns.

Oil Demand Steadily Rising

As for the long term future, the prospects are distinctly bright from the viewpoint of demand. Prophets that are not without honor envision a continued steady increase in automobile registrations and a further rise in motor fuel consumption for years to come. Twenty-five years from now, they predict, there will be 37,000,000 automobiles and trucks registered in the United States, or 43 percent more than the 26,000,000 registered in 1935.

Furthermore, the future is expected to bring larger demand for other petroleum products. Fuel oil, in particular, is likely to come into much wider use, in supplying the steadily increasing numbers of oil burners. At the beginning of 1936 there were about 1,100,000 oil burners in operation, compared with 12,500 in 1921. For this increased number of oil burners in operation in 1936 it is estimated that the year's requirements of domestic heating oil will be around 52,000,000 barrels. Burner manufacturers and some of the oil companies figure that the United States offers a potential market for 14,000,000 furnace-heated homes, and they are aggressively developing that market, as evidenced by the fact 145,000 oil burners were sold in 1935. The importance of this market to the petroleum industry is evident through a comparison with the market for gasoline. It is estimated that the heating oil demand may surpass gasoline consumption when and if there are between 5,000,000 and 6,000,000 oil burners in use. The growing demand for fuel oil is especially advantageous because it helps to equalize the consumption of petroleum in the different seasons of the year. In the spring, summer, and autumn, gasoline consumption is heavy, and when that demand shrinks in the winter, the season of heavy demand for fuel oil is at hand. Bulk storage plants, may operate more economically handling both gasoline and fuel oil.

Control Relatively Effective

In contemplating the oil industry's bright prospects for heavy consumption of its products, it must be remembered, of course, that the large demand will not mean prosperity for the oil companies unless there is at the same time a reasonable balancing of supply with the demand. It will not profit the companies if demand doubles while supply more than doubles. But in connection with control of supply, also, the outlook is promising. Scientific progress has facilitated discovery of new oil fields, and for a long period there probably will be an ever-present threat of large potentials. But in the meantime, there has been progress, also, in proration, the means devised for holding output of flush fields within market demand. Proration is having its difficulties today, but on the whole, production control has become remarkably effective. It seems reasonable to assume that in the years ahead, production control is likely to prove generally successful, if not more effective than at present.

Louisiana Has New Governor

Louisiana was claiming the interest of oil men last week, when a new governor took office. Louisiana has been giving rise to much anxiety lately, through its steadily increasing crude oil production. Considerable significance is attached, consequently, to the policies that will be pursued by the Louisiana officials in regulating the oil fields in the state. The oil proration orders originate, under Louisiana law, with the commissioner of the department of conservation. That official is appointed by the governor. The present commissioner is Robert S. Maestri. Under him, and carrying out his orders, is the director of the division of mines and minerals, of the conservation department. This office is held at present by Dr. J. A. Shaw.

The new governor who took office May 12 is Richard Webster Leche, elected by a majority unparalleled in Louisiana history. The term of the office is four years. The governor, not yet 40 years old, has said that he will continue the policies of his former political chieftain, Huey P. Long. But he is said to be suave and diplomatic, in contrast with the curt and militant Long.

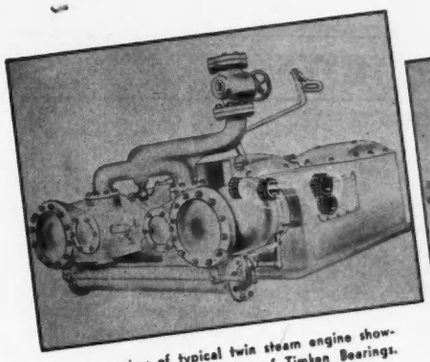
No Change In Policies Planned

Pressed by newspaper men and oil men for information as to the policies he will pursue regarding oil regulation, the new governor talked pleasantly and left the impression that matters will rock along largely as they have been doing. Like other political leaders in Louisiana, past and present, he does not favor the state's participation in the Interstate Compact. He wants to see Louisiana production increase, and thinks that membership in the compact might interfere with that objective. At the same time, he offers assurance that the state's oil output will not be permitted to upset the industry's markets, since Louisiana, as well as the other oil states, would suffer.

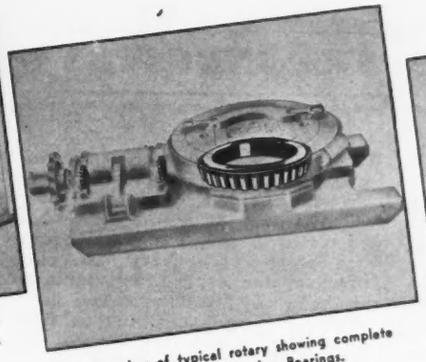
As stated before, the outlook has not been altered much by what the new governor has said. In the past Louisiana already has been pursuing the course that is contemplated for the future. And the course that has been taken has not been re-assuring to the oil industry. It has not tended to hold national output within the indicated market demand. The Louisiana course has not encouraged cooperation among the leading oil states. It has tended to undermine such advantages as the Interstate Compact has afforded. It has resulted finally in the threat of a Texas Railroad Commissioner that Texas may be forced to begin claiming, too, a greater share of the national market. Nor is such a threat a light matter, considering how much crude oil Texas could produce if allowables were raised.

Louisiana Oil Law Untested

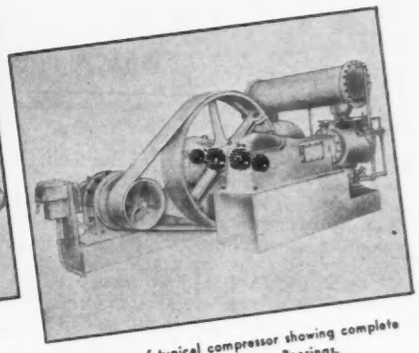
Aside from the attitudes of Louisiana's officials, the oil industry is concerned also with the laws and regulations which constitute that state's system for controlling crude oil production. The law under which the conservation commissioner issues oil proration orders is a new statute, enacted in 1935. It provides for limitation of production to the market demand. The law has not been tested in the courts. (That indicates, perhaps, how light has been the restraint involved.) When the law begins to bear down more heavily, and passes under the scrutiny of the courts, it will quite likely be found imperfect. In the eyes of some, the new and untried Louisiana law itself embodies the most serious danger in the production control situation.



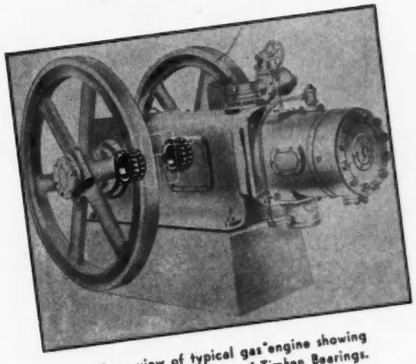
X-ray view of typical twin steam engine showing complete application of Timken Bearings.



X-ray view of typical rotary showing complete application of Timken Bearings.



X-ray view of typical compressor showing complete application of Timken Bearings.



X-ray view of typical gas engine showing complete application of Timken Bearings.

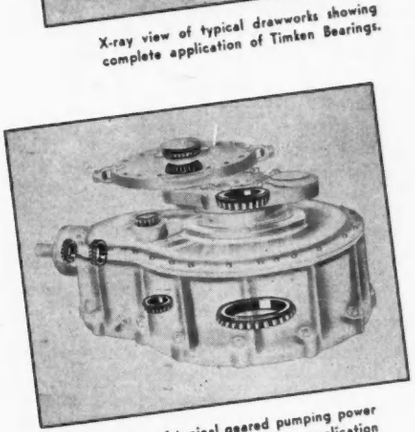
AN X-RAY VIEW OF THE OIL SHOW

If you had X-ray eyes so that you could look right into the many different kinds and makes of heavy duty oil field equipment at the oil show, you would find one striking similarity in an overwhelming majority of them—a preponderance of Timken Bearings.

There are more Timken Bearings than ever at this year's show, for as operating speeds and capacities have increased in response to growing production requirements, the need for Timkens' frictionless performance, radial-thrust load capacity and ability to hold moving parts in correct and constant alignment has become more and more urgent.

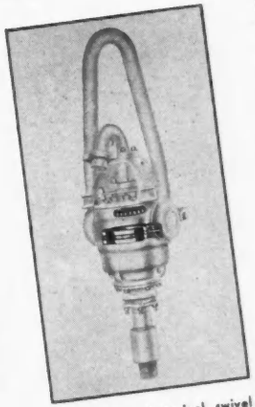
The dominance of Timken Bearings in all kinds of heavy duty machinery throughout the oil fields is not the result of fortunate circumstance. It has been won—and is being maintained—by downright superiority . . . because there is no substitute for the exclusive combination of Timken tapered construction, Timken positively aligned rolls and Timken Alloy Steel.

Your most important question when buying rig fronts, rotaries, drawworks, swivels, engines, pumps, compressors or any other kind of oil field equipment—"Is It Timken Bearing Equipped?"



X-ray view of typical drawworks showing complete application of Timken Bearings.

X-ray view of typical geared pumping power showing complete application of Timken Bearings.



X-ray view of typical swivel showing complete application of Timken Bearings.

Tapered Roller TIMKEN BEARING EQUIPPED

A symbol of quality for any piece of equipment with which it is associated

Look for Timken Exhibit Booth No. 72-73

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN TAPERED ROLLER BEARINGS

MEN IN THE INDUSTRY'S NEWS

S. D. BUTCHER is in charge of the Gulf Coast office of Turman Oil Company (subsidiary of Middle States Petroleum Company) recently opened at 615 Esperson Building, Houston.

H. W. PENTERMAN has been transferred by Shell Petroleum Corporation from Houston to be manager of the land department at Tulsa. James H. Hesterly, who has been land agent at Shreveport, has been transferred to Houston as assistant to B. L. Ryan, manager of the land department.

DONALD A. POWELL, for the past three years connected with Michigan Pacific Oil & Gas Company, Saginaw, Michigan, has resigned to become field superintendent for Drilling & Exploration Company, headquarters at Pampa, Texas.

DR. T. M. JOHNSON, former director of Carib Syndicate, and one of the pioneers in the development of the Mexican oil fields, died of a throat affection in New York City on May 7. Interment took place in Canton, Ohio, May 11.

FRANK McKAY of Tulsa has been elected a vice president and a director of Superior Oil Corporation, Tulsa.

E. B. SIM of Kiefer has been appointed superintendent of Paragon Oil Company

RICHARD T. LYONS, vice president of Skelly Oil Company, Tulsa, was in Houston last week on business.

J. W. JORDAN, superintendent of production for Sinclair Prairie Oil Company in West Texas and New Mexico with headquarters at Midland, Texas, has been placed in charge of the Permian Basin area and the Texas Panhandle. Heretofore, the company's production activities in the two districts have been under supervision of Glen Harroun, Fort Worth, who will remain in charge of operations in the balance of Texas, Louisiana and Arkansas. Harroun has a reputation of being one of the most extensive users of a private airplane for transportation during the past four years, owing to widely scattered operations requiring this means of travel so as to be on hand for the completion of important wells. The division of territory will enable Harroun to spend more time at the Fort Worth office.

A. E. CHESTER, superintendent of production for Magnolia Petroleum Company in the Texas Panhandle with headquarters at Pampa, has been transferred to Michigan to take charge of development work being carried on in Lenawee County by Socony-Vacuum Oil Company, the parent organization. Jas. R. Posey, production foreman in the Luling, Texas, district, has succeeded Chester at Pampa.

T. A. CARLTON, independent oil operator, Houston, is back at work after having recovered from an automobile accident.

Officials of the Sun Oil Company and Sun Pipe Line Company, shown above, gathered recently at Kilgore to present service pins to 54 employees in the production department and 11 with the pipe line unit credited with 10 or more years of continuous service. Those in the photo, back row, reading left to right, are: W. C. Kinsolving, Beaumont, general superintendent for East Texas division, Sun Pipe Line Company; M. L. Brown, Dallas, assistant general production superintendent; John A. Ritter, Dallas, general production superintendent; Martin J. Koitzsch, Philadelphia, editor *Our Sun*. Front row, reading left to right, J. L. Manes, Dallas, safety director; Asa P. Davis, Dallas, superintendent of transportation; Matt B. Sweeney, Dallas, general agent, and John G. "Jack" Pew, Dallas, assistant to the vice president.

C. R. PARRISH, pipe line superintendent for Sinclair Wyoming Oil Company, has been seriously ill in Casper.

CLIFF E. SAVAGE, assistant chief scout of Carter Oil Company, Tulsa, has been dismissed from a hospital, where he was confined nine weeks with a broken leg. It will be several weeks before he can return to duty. The accident occurred in Pauls Valley.

GEORGE TAYLOR, geologist for Continental Oil Company, has been transferred from headquarters at Ponca City to McPherson, Kansas.

J. SEASHORE, scout for Stanolind Oil & Gas Company, Houston, last week attended the funeral of his father, T. Seashore, at Fresno, California.

E. L. DAVENPORT, independent oil operator, Houston, has returned from a business trip to Washington, D. C. He was accompanied by Mrs. Davenport.

T. RIEBER, chairman of the board of The Texas Company, was one of the passengers aboard the German dirigible which took to the air May 11 on its first eastward trip from Lakehurst, New Jersey, to Europe.

ARTHUR O. SIMPSON, 63, vice president of Simpson-Fell Oil Company, Ardmore, Oklahoma, died May 9 at Denisson, Texas, where he had resided since early childhood.

PLEAS O. HARDWICK, vice president of Spartan Refining Company, Shreveport, has been elected president of the Louisiana-Arkansas Refiners Association for the coming year. Other officers elected are: J. A. Welch, Louisiana Oil Refining Corporation, Shreveport, first vice president; Horace Canon, Root Petroleum Company, Shreveport, second vice president; Leon C. Grosjean, Shreveport, secretary (re-elected), and E. F. Brakefield, Louisiana Oil Refining Corporation, treasurer.

Directors elected are: D. W. Harris, Louisiana Oil Refining Corporation; T. H. Barton, Lion Oil Refining Company; D. P. Hamilton, Root Petroleum Company; B. H. Gray, Atlas Pipe Line Company; M. J. Grogan, Rodessa Oil & Refining Corporation; George F. Fox, H. H. Cross Company; W. B. Hassett, Stephens Refining Company; D. B. Williams, Chalmette Petroleum Corporation; H. B. Pullar, Berry Asphalt Company; E. F. Griswold, Griswold Refining Company; and Paul M. Brown, Bayou State Oil Corporation.

The executive committee consists of the following: Harwick, Welch, Canon, T. M. Martin, Lion Oil Refining Company, and Grogan.

Manufacturing committee: R. B. Pierce, chairman, Louisiana Oil Refining Corporation; R. T. Colquette, Root Petroleum Company; J. J. Allinson, Lion Oil Refining Company.

Membership committee: D. A. Brown, chairman, Root Petroleum Company; Martin and H. G. Williams.

International rigid-frame Model TA-40 TracTracTor owned by the White Deer Pipe Line Co., laying pipe in Oklahoma City.

Bank on International Industrial Power to Handle the Tough Jobs

INTERNATIONAL HARVESTER'S long experience as a manufacturer of tractors and power units is the most reliable guide to follow when you need industrial power.

To get the real lowdown on International Industrial Tractors and Power Units, trust the men who have put this equipment through its paces. Then you will have a good idea of what International Power can do on your jobs. No matter how tough the work, if it's in International's power range you can expect the utmost in results. And, good as International performance is, it becomes all the better when the cost sheets are figured and you find out about economy.

The International line includes TracTracTors, wheel tractors, and power units, with gasoline and Diesel engines. The power units range in size from 12 to over 100 h.p., and there are light-duty engines from 1½ to 5 h.p. Keep this fact in mind also—no matter where your jobs are, International factory-standard service is close by to keep this equipment on the job.

International Power Unit, burning natural gas, pumping in the East Texas field.

For detailed information, call on the nearby Company-owned branch or authorized industrial dealer.

INTERNATIONAL HARVESTER COMPANY
(Incorporated)
606 So. Michigan Ave. Chicago, Illinois

INTERNATIONAL HARVESTER

Leche

[*Continued from page 44*]

are some middle men who should be eliminated and that the State of Louisiana itself should be in a position to receive the maximum amount for its state-owned lands.

Board to Be Created

"At this time, I condemn nothing but the system which I am convinced is wrong and which, I believe, in the interest of the people, should be remedied. We, therefore, propose and will recommend to the legislature a state mineral board to be composed of the governor and two members appointed by the governor. Of course, as governor I will be in a position to tell which bid was to the best interest of the state. However, I feel that three heads are better than one, and, with two competent members to assist, I feel sure that the interest of the state would be well protected.

"There are some other features in the present system, which, I believe, are inadequate. First, there is no limit as to the acreage which can be leased. Leases have been let involving as much as one-half million acres, and these lands have been held with large portions of them out of development, thus depriving the state of additional revenues.

Limitation on Acreage

"It is my opinion that such leases should be limited to approximately 5,000 acres which, it appears to me, are large enough tracts to warrant exploration for oil or for minerals. I further believe that a time limit should be placed on these leases by law, and it appears to me that three years is long enough to permit a successful bidder to explore and drill for oil. If three years is not sufficient, then the land should be turned back to the state and somebody else given an opportunity to develop it.

To File Daily Returns

"I further believe that the lessees of state mineral lands should file daily sworn production returns in order that the state might be informed as to the amount of the royalty due it under the lease. I further believe that an accurate description of the land so leased should be contained both in the advertisement and in the lease. I propose that the state mineral board be given full authority in the matter of leasing state-owned land with full power to do everything necessary to protect the interest of the state."

The custom in the past has been to describe lands to be leased in an indefinite manner such as the following: " * * * * * * for the lease of oil, gas and other mineral rights in and to the following described tracts in Natchitoches Parish, Louisiana, to-wit:

"All the bed and bottom of Black Lake, belonging to the State of Louisiana."

Governor Leche proposes that the descriptions shall be definite.

Governor Leche declared that it was his belief that all royalties received from leased lands in excess of the one eighth minimum required by law and up to $2,000,000 a year should be dedicated to the State University and to the Hospital Board.

Higher Tax on Gas

The increased tax on natural gas, the governor said, he believes to be necessary in order to secure funds to match the federal government in the social security program.

"We did not pick natural gas through any animosity toward the people in the gas business or for any other reason than that it appears, at this time, to be one of two sources upon which a tax could be placed without greatly affecting the mass of the taxpayers of this state. In the first place, Louisiana produces billions of cubic feet of natural gas, great quantities of which are shipped out of the state to other cities and other states.

"The only revenue which Louisiana derives today from its vast natural gas deposits is a severance tax of one fifth of one cent per thousand cubic feet, yet in my home, I pay 90 cents per thousand cubic feet. Many of you pay as much. I do not think anybody pays less than 65 cents or 70 cents. Now, it seems to me that somewhere between that one fifth of one cent, which the state gets, and that 90 cents, which we pay, there should be room for some money to help the needy people under the social security program.

"Now there is another way of looking at it. Out of that one fifth of one cent per thousand cubic feet the state receives a yearly income of approximately $490,000, yet off of our severance tax on oil the state receives in the neighborhood of $6,000,000. It seems to me that there is too great a discrepancy between the return from our oil, which is $6,000,000 and the return from our gas which is less than one half million dollars.

"We therefore, propose and will recommend to the legislature a tax on natural gas yielding a sufficient return to the state, which, when matched with the federal grant, will enable us to place into effect, at least, a part of the social security program. Funds from the tax on natural gas will be dedicated to that purpose."

The governor says that additional taxes are distasteful and that he is recommending only one tax in addition to the natural gas tax increase. The other tax he proposes is on soft drinks. He proposes to get $2,000,000 from soft drinks for the social security program.

The Governor did not state the amount of the increased tax on gas or the nature of the new tax.

Asked specifically whether it would be a pipe line tax or an increased severance tax, the goveror answered, "It may be both." Another report is that a sales tax may be worked out to make the levy on the various transfers.

TEXAS AND LOUISIANA
Conservation officials to hold joint meeting

AUSTIN, TEXAS.

A CONFERENCE between Louisiana and Texas conservation officials to work out methods for regulation of the Rodessa field will be held soon.

Texas Railroad Commission Chairman Ernest O. Thompson announced at the statewide hearing last Thursday that his invitation to a joint meeting had been accepted by Dr. J. A. Shaw, director of mineral development of the department of conservation of Louisiana. Shaw advised that he would attempt to have present the governor and Louisiana conservation officials at any time the Texas commissioners could come to either Baton Rouge or New Orleans.

Thompson said that a definite date for the hearing would be set soon.

Plan Appeal

[*Continued from page 44*]

day, May 13, the wells produced 15,648 barrels and for the next 24 hours, 17,225 barrels. Under the per-well allowable of 350 barrels the 13 wells would be allowed to produce 4,550 barrels each 24-hour period.

The oil at first was run into storage but Wednesday Eastern Texas Pipe Line Company which has the connections to these wells began loading 50 tank cars at its "Burford Switch" loading rack near Jefferson, Texas, on the Louisiana, Arkansas, and Texas Railroad, for consignment to New Orleans.

Operators in the Louisiana part of Rodessa were thrown into a state of excitement by the invoking of this order by Pelican Oil & Gasoline Company as they had shut their wells back to the regular allowable a few days after receiving the Shaw order late in March after other operators in the field had appealed to the then governor of Louisiana, James A. Noe.

More recently, Eastern Texas Pipe Line Company has gone into federal court in East Texas seeking an injunction to restrain the Federal Tender Board from interfering with the pipe line company's transportation of the oil produced under the Shaw order, in interstate commerce.

What the result of the present controversy will be is problematical. Operators owning offset acreage may open their wells to test the validity of the order, which practice might spread throughout the field, upsetting the price structure, and cause a rift between enforcement officials of Louisiana and Texas.

Operators in Rodessa for some time have expected some action to re-rate the allowable there. The present method of allowable of 350 barrels per day per well despite respective potential daily yield is held inequable by many operators, who have expressed the feeling the field as a whole should be given an allowable and a per-well ratable production schedule worked out.

In connection with the special order given to Pelican Oil and Gasoline Company by Dr. Shaw, and whose legality has been upheld by the state attorney general of Louisiana, Governor Leche declared that he would back any legal order issued by the commission. Operators in Rodessa planned an appeal to the governor to take action on the situation.

The Economic Life of Sucker Rods

By EMORY KEMLER, Gulf Oil Corporation, Pittsburgh, Pennsylvania.

THE evaluation of sucker-rod service and the determination of the economic life of any particular string of rods require a knowledge of the behavior of the rods under operating conditions. To be able to determine the time when rods should be replaced, it is necessary to know what would happen if the rods were to remain in service; i.e., it is necessary to have some analytical relation between the number of failures and the days of service. This paper gives a general law which has been found to give the relation between the number of failures and the days of service. This law has been used to derive a formula which gives the economic life of the rods. With the collection of more detailed information, it should be possible to determine the effects of speed, stroke, corrosion, loads, etc., on rod failures. A preliminary study of field records of test strings of sucker rods indicated that the number of failures could be expressed in the form of:

$$N = b\,T^m,$$

where** N **represents the number of the failure and** T **represents the time at which the** ***nth **failure occurred,** b **and** m **being constants which determine the character of the curve showing the relation between the number of the failure and the time at which it occurred.**

Since a curve which can be expressed in the form as given above becomes a straight line when plotted on log-log paper, a large number of the records on test strings was analyzed by plotting the number of the failure against the time in days which the rod string had been in service. The slope of the straight line on log-log paper becomes the exponent of T**, and the coefficient** b **becomes equal to:**

$$\frac{1}{T_o^m}$$

***where** T_o **is the time at which the first failure occurs, provided the initial failures follow the general law.** T_o **can be found by extrapolating the curve found to hold during the latter part of the life of the rods until this curve hits the time line at** $N = 1$**. Figures 1 and 2 show typical results obtained from field tests of rod strings. It will be seen that most of the curves given in these figures follow, with a surprising degree of accuracy, a straight line, particularly after the first few failures.**

In many cases the initial failures may occur earlier than the curve, which is based on the behavior during the latter part of the life of the string, would indicate. This is no doubt due, in many cases, to the fact that a few rods in the string have defects due to poor material or improper manufacture; and, after these few initial defects have been eliminated from the string by failures, the rod string then follows a consistent law.

This paper was presented at the Mid-Year Meeting of the American Petroleum Institute Division of Production, Mayo Hotel, Tulsa, May 14-15, 1936. The opinions expressed are those of the author and should not be construed as an official action or opinion of the Institute or of this magazine.

THE actual plot of rod failures against the hours' operating time cannot be expected to follow too closely the average curve, because the time which the rods were in service is not accurately known. In some cases there may be considerable down-time due to proration, excessive tubing failures, rig troubles, well clean-out, etc., which are not reported on the records. Also, there may be changes in operating conditions, particularly where the test string has been in service for several years, resulting from changes in corrosiveness of fluid, changes in sub-surface conditions which require different operating speeds and strokes, changes in well condition due to work-overs, plugging back, etc., changes in sub-surface conditions which may result in less gas (which will no doubt result in increased rod loads), and many other similar factors which will influence the behavior of a string of rods.

Many of the curves studied show definite characteristics resulting from specific operating conditions. For instance curve No. 2 (Figure 2) shows what happens when there are changes in well or operating conditions. Curve No. 1 (Figure 1) shows a jump in time after the seventh failure before resuming the same trend. The first few failures may have been hastened by defects, or there may have been some changes in well conditions or possibly considerable down-time due to reasons enumerated earlier. Curve No. 1 (Figure 2) is typical of conditions where corrosion progress uniformly and finally reaches a stage where many of the rods become over-stressed. At that time the failures occur rapidly, and the curve has a very steep slope.

The other curves follow with surprising accuracy a straight line throughout their life. The wide range of conditions and fields which the test strings covered makes it safe to use the law for general analysis of problems of selection and use of rods.

A general analysis as to the variations in slope and the value of T_o was not attempted because of lack of complete information as to well loads, data on the corrosiveness of the fluid, crookedness of the hole, and similar factors previously mentioned.

The gradual introduction of dynamometers in the field and the collection of complete data on well loads, corrosiveness of the fluid, and other factors will do much to explain variations in the exponent m and the constant b or T_o.

This analysis is by no means complete, but it serves as a step toward the solution of the more general problem of rod failures, and serves as a basis for carrying out

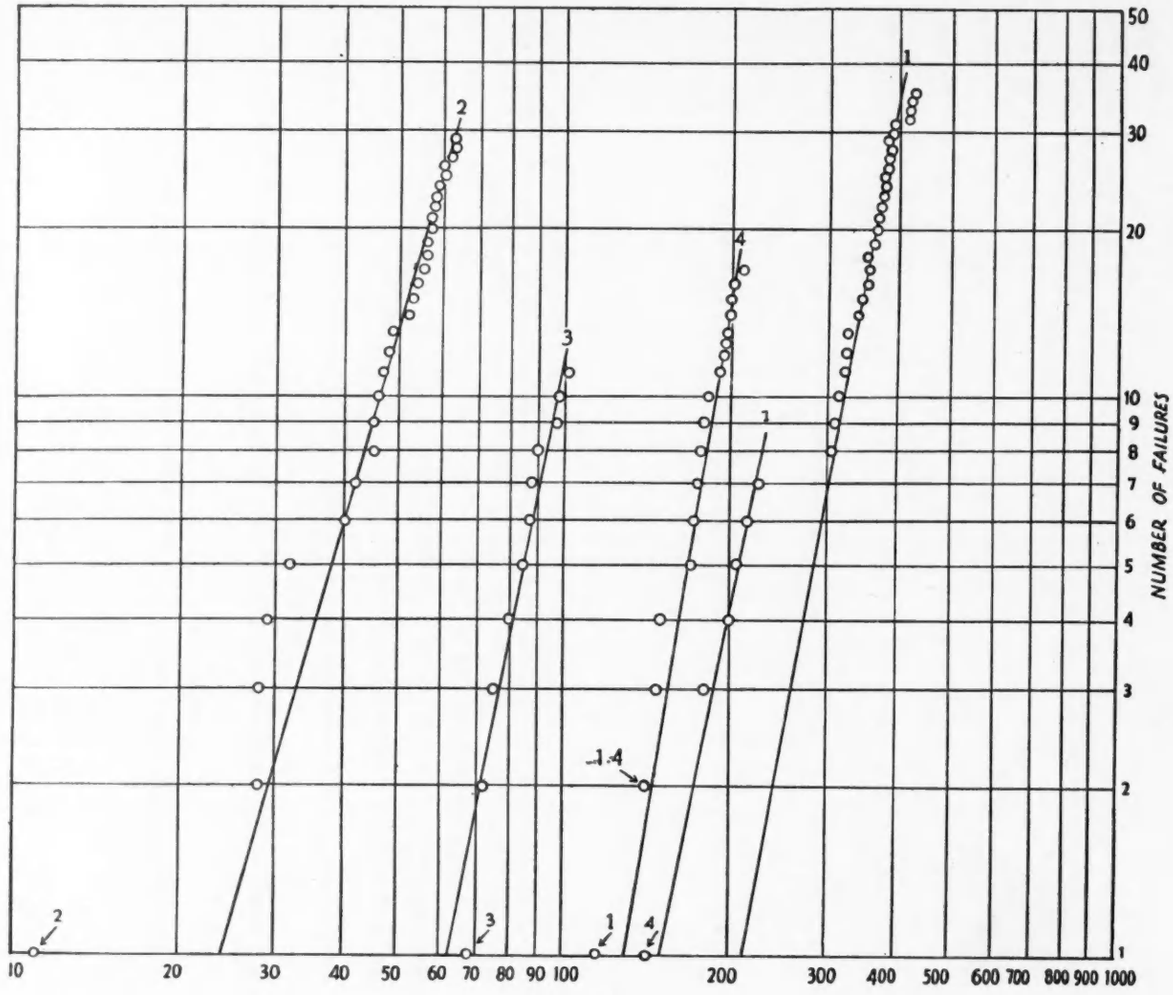


FIGURE 1
Days of Service

general studies on the valuation of rod service and economic life of rods.

Economic Life of a String of Rods

The cost of a string of rods at any time T will be equal to depreciation plus interest, insurance, profit, etc., plus cost of replacing rods plus value of lost production. Expressed analytically:

$$\text{Cost of rods} = (C - C_s) + \frac{Ci}{365}T + C_rN + C_oN$$

$$= (C - C_s) + \frac{Ci}{365}T + (C_r + C_o)N \qquad (1)$$

Where

T = days rods have been in operation.
N = number of failures to time T.
C = initial cost of rod string. Includes cost of rods plus cost of delivering rods to well plus storage charges plus cost of installing rods in well.
C_s = salvage value of rods.
C_r = cost of replacing a rod in a well = cost of new rod plus cost of labor in making the replacement.
C_o = value of oil lost during down-time or may include loss resulting from water intrusion in wells which takes several days to get back to regular rate.
i = interest rate plus insurance plus any other investment charges.
A_c = average cost per day.

The average cost per day at time T then becomes:

$$A_c = \frac{C - C_s}{T} + \frac{Ci}{365} + (C_r + C_o)\frac{N}{T} \qquad (2)$$

If the relation between N and T follows the law:

$$N = bT^m \text{ or } T = \left(\frac{N}{b}\right)^{\frac{1}{m}} \qquad (3)$$

Then,

$$A_c = \frac{(C - C_s)\,b^{\frac{1}{m}}}{N^{\frac{1}{m}}} + \frac{Ci}{365} + \frac{(C_r + C_o)Nb^{\frac{1}{m}}}{N^{\frac{1}{m}}}$$

$$= (C - C_s)b^{\frac{1}{m}}N^{-1} + \frac{Ci}{365} + (C_r + C_o)N^{\frac{m-1}{m}}\,b^{\frac{1}{m}} \qquad (4)$$

If A_c is to be a minimum:

$$\frac{dA_c}{dN} = 0 \qquad (5)$$

$$\frac{dA_c}{dN} = (C - C_s)b^{\frac{1}{m}}N^{\frac{1}{m}-1}\left(\frac{-1}{m}\right)$$

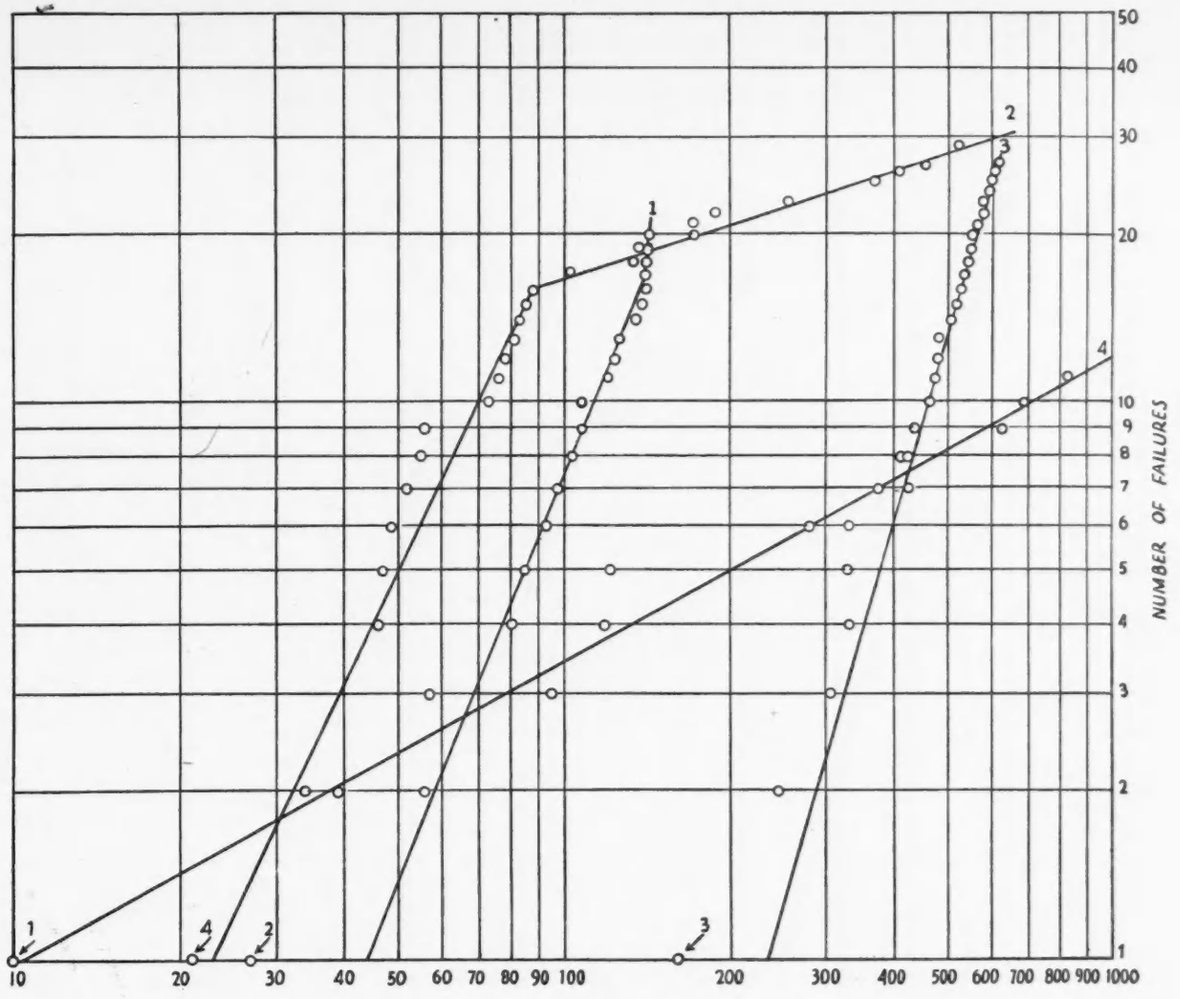


FIGURE 2
Days of Service

$$+0+(C_r+C_o)N^{-\frac{1}{m}}\left(\frac{m-1}{m}\right)b^{\frac{1}{m}}$$

Setting:

$$\frac{dA_e}{dN}=0;\ (C-C_s)b^{\frac{1}{m}}N^{-\frac{1}{m}-1}\left(\frac{-1}{m}\right)$$

$$+(C_r+C_o)N^{\frac{-1}{m}}\left(\frac{m-1}{m}\right)b=0$$

Or:

$$-(C-C_s)N^{-1}+(C_r+C_o)(m-1)=0 \qquad (6)$$

$$N=\frac{(C-C_s)}{(C_r+C_o)\ (m-1)} \qquad (7)$$

If the salvage value of a string of rods is taken as 30 percent of their initial value, $(C-C_s)$ becomes 0.7C, and the formula reduces to:

$$N=\frac{0.7C}{(C_r+C_o)\ (m-1)} \qquad (8)$$

To find the time at which the rods should be replaced, the same procedure can be followed—except that N be eliminated from equation (2) and the derivative be taken with respect to T. The resulting equation can be conveniently expressed in the form:

$$T=T_o N^{\frac{1}{m}} \qquad (9)$$

Where T_o is the value of T at which $N=1$ if the law $N=bT^m$ is followed. T_o is, therefore, the point where the straight-line curve hits the time axis where $N=1$.

Another question which might be of some interest is the time at which the average cost per day of using a string of rods equals the average cost per day just before the first failure occurred. To obtain this, it is necessary to set the average cost at time T_o equal to the average cost at any time T later.

This gives:

$$\frac{0.7C}{T_o}=\frac{0.7C+NC_r}{T} \qquad (10)$$

Substituting equation (9) in (10), we get:

$$\frac{0.7C}{T_o}=\frac{0.7C+NC_r}{T_o N^{\frac{1}{m}}}$$

Or:

$$N-\frac{0.7C}{C_r}\ N^{\frac{1}{m}}+\frac{0.7C}{C_r}=0 \qquad (11)$$

This equation is not easy to solve except for $m=2$

THE NATIONAL

SUPPLY Exhibit

. . . covers an area of 9480 square feet the largest display of modern oil field equipment at the Tulsa Exposition

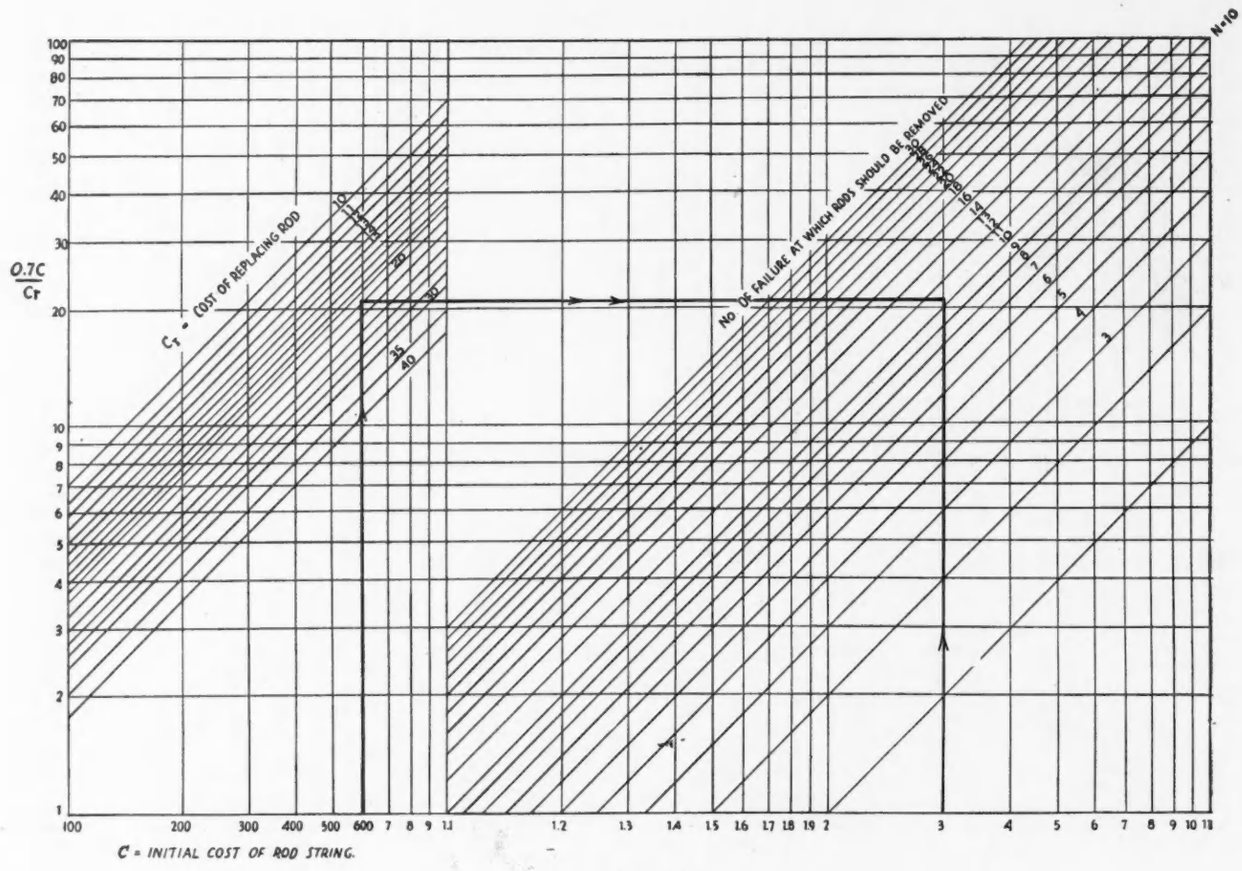


FIGURE 3
Chart for Determining Failure at Which Rods Should Be Removed

and $m = 3$. It is possible, however, to obtain solutions for the value of:

$$\frac{0.7C}{C_r}$$

If N and m are given, by working out values of this economic factor $\frac{0.7C}{C_r}$ for various values of N and m, curves can be plotted. C_r has been used, since C_o is additive and C_r can be made to include both if desired.

Discussion of Equation for Economic Life of Rod Strings

Formulas (8) and (9) give, respectively, the number of the failure and the time at which the cost of a particular string of rods becomes a minimum. The problem of determining the economic life of a string of rods is somewhat different from that commonly encountered in determining the economic life of a piece of equipment. In the case of the rod string, straight-line depreciation was assumed; however, the depreciation rate cannot be determined until the economic limit of the rod string has been determined. Fortunately, the formulas are of such a nature that this factor can be handled analytically much easier than it can be used in the step-by-step calculations.

It will be noted that the formula for the number of the failure at which the rod should be replaced involves only one factor which depends on the law which the failures follow—this factor being the exponent m, which is the slope of the time-failure curve plotted on log-log paper. The time at which the cost of the rod string becomes a minimum, however, involves T_o, which depends on the constants b and m. N can, of course, be replaced in equation (9) by its value in equation (8) if desired.

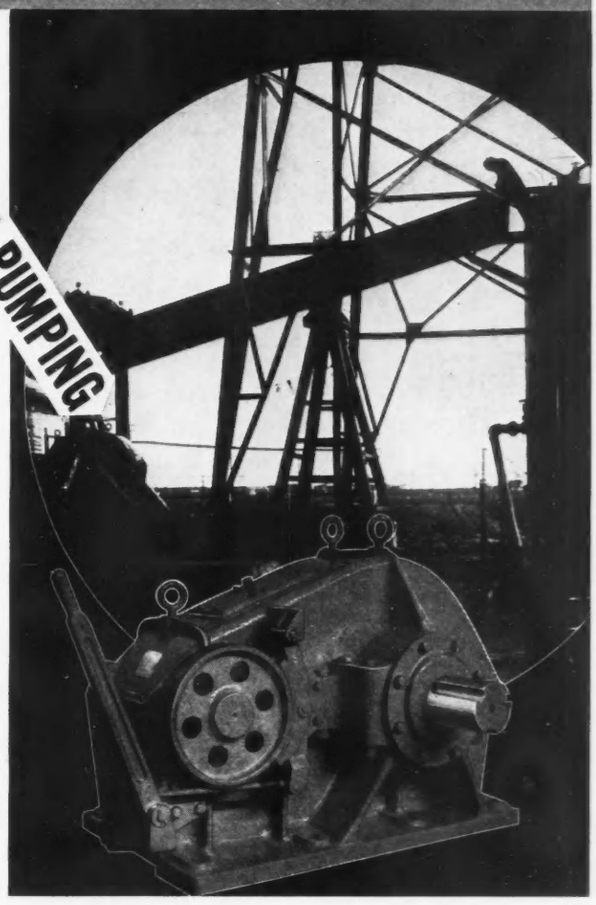
Formula (8) shows that the value of the lost production, or any expenses incidental to deferred production, has the same effect on the economic life of the rods as the cost of replacing the rods. Ordinarily, the factor C_o will not enter into the problem, as the production is not lost, but merely deferred. In some wells which have to be pumped for several days after being down due to rod troubles, before the oil production becomes normal, a considerable charge might be made which will include operating expenses for the time necessary to get oil production back, plus interest on the investment of the rig during the down-time.

The variation of the economic number of failures with the exponent m is very interesting, particularly when considered in relation to the plot of the number of failures versus day's service, as shown in Figures 1 and 2. If m is *1*, N becomes infinite. On first analysis, the formula appears to be inconsistent for this value of m; but the geometrical meaning of m explains this apparent inconsistency, and shows the formula to be correct. If $m = 1$, it will be seen that the time between failures is equal throughout the life of the rods. For instance, if the second failure occurred 10 days after the first failure, the 21st failure would occur 10 days after the 20th failure, and so on. If, therefore, the rods can be economically justified at the time of the first failure,

TWIN PROTECTION

WITH TWIN-CRANK PUMPING

when Westinghouse Units are on the job



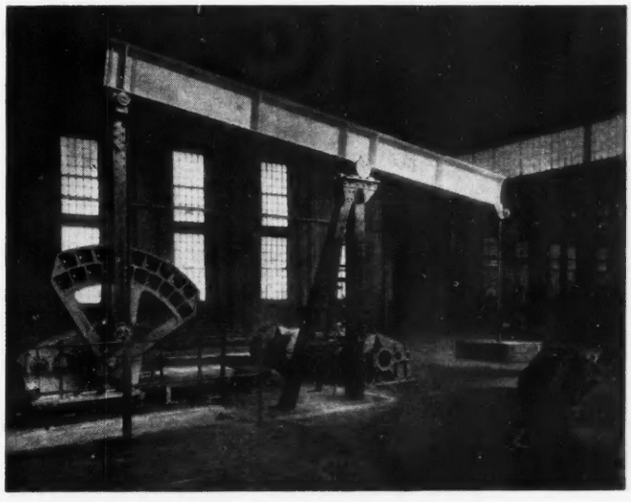
● The pumping equipment on a well that's down a mile or more can't have any weak spots. For jobs like this many operators prefer the double protection of balanced twin-crank design and the dependability of a Westinghouse unit especially built for such service.

The exact unit needed can be obtained from stock—an OP pumping unit with double-extended slow speed shaft . . . smooth single helical gears . . . and tapered roller bearings for permanent alignment with minimum friction loss. Gears, pinions and shafts are made of BPT "tough-hard" heat-treated steel. An oil settling chamber in the gear case keeps foreign matter out of the lubricant. Housings are heavily reinforced at points of stress, and the base is especially wide to insure rigid mounting. All units are adaptable for either right or left hand brake mounting and conform to API specifications on rating of pumping machines.

No wonder they do a BETTER job—one of the *many* better jobs being done by Westinghouse pumping units in every conceivable application.

J 07014

DISTRIBUTED BY OIL WELL SUPPLY COMPANY, SUBSIDIARY OF UNITED STATES STEEL CORP.



To make certain that each gear unit will meet the most severe requirements of oil field service, we virtually "pump your well" with it before shipment.

By means of the "Oilwell" unit (left), we simulate actual pumping conditions. Through adjustments of the crank counterbalance and the load on the polish rod, the gear unit is subjected to full-load conditions, and to the torque reversals it must meet in service.

★ ★ WESTINGHOUSE 1886 W 1936 GOLDEN JUBILEE ★ ★

Westinghouse

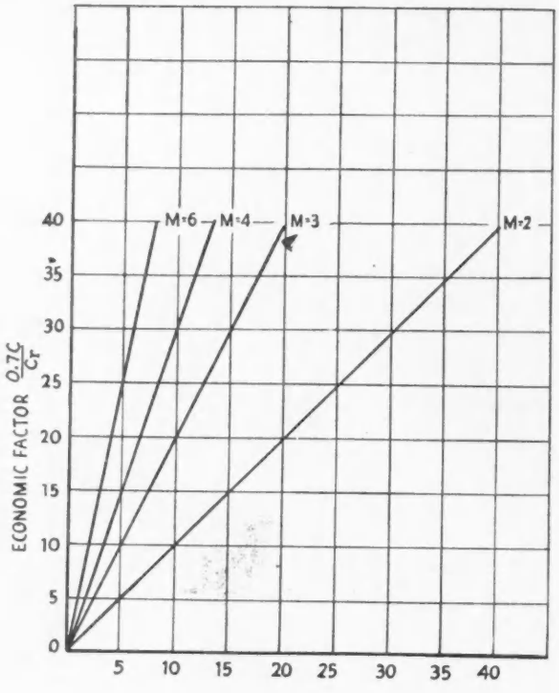


FIGURE 4

No. of failures at which rods should be removed. Curve Showing Relation Between Economical Number of Failures and Economic Factor $\frac{0.7C}{C_r}$.

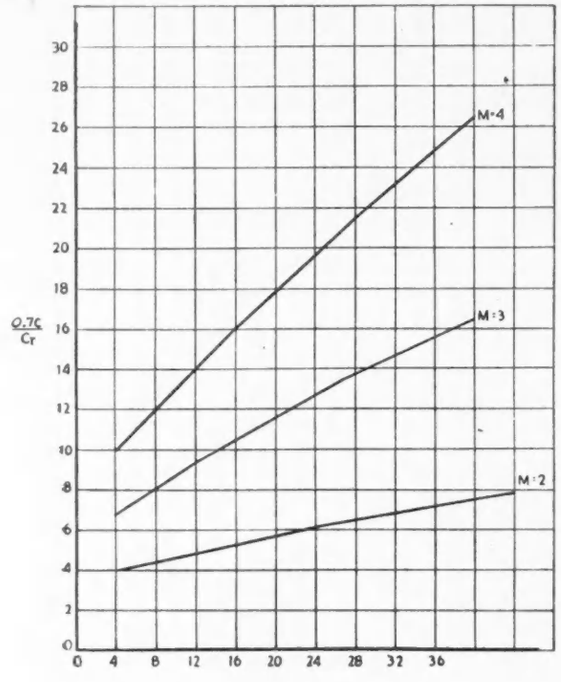


FIGURE 5

Curves for Determining Number of Failures at Which Cost Per Day Equals Cost Per Day at First Rod Failure.

TABLE 1

Application of Formulas to Curve No. 4 (Figure 1)[1]

C_r[2]	N[3]	T[4]	A_c[5]	Cost at Time T_o	Cost at End of 15 Failures (200 Days)	Saving by Scrapping at Time T
10	6	172	2.65	3.10	2.72	14
15	4	160	2.85	3.10	3.10	50
20	3	152	3.00	3.10	3.48	96
30	2	143	3.10	3.10	4.23	226

[1] Initial cost of rods assumed at $395.
[2] C_r = cost of making replacement.
[3] N = failure at which average cost is a minimum.
[4] T = time at which cost is a minimum.
[5] A_c = average cost per day for life of rods.

they can be justified at any time during their life. Rods following such a law should, therefore, never be removed unless some new rod, which will not fail, becomes available. Obviously, if for $m = 1$ the rods should not be removed, they should not be removed for m less than *1*. If m is less than *1*, it indicates that the time interval between rod failures becomes larger the longer the rods are in service and, therefore, the average cost per day will decrease indefinitely with time. For this case, it is also obvious that the rods should never be removed.

Curve No. 8 (Figure 2) shows a well where this apparently impossible condition exists. The wells in this field present an unusual condition, however, in that the rods become coated with calcium carbonate, and this coating protects them from corrosion. Apparently, the effectiveness of this coating increases with time, resulting in the peculiar condition that the rod failures become less frequent with the increase in service. For normal rod strings where m is greater than *1*, it is seen that after the first failure the rod failures increase with time if the law $N = bT^m$ holds.

The formula has been derived to apply only to the determination of the economic life of a particular rod string. To compare one rod string with another, the formula is also useful. A rod string cannot be properly evaluated with reference to some other rod string unless both are compared at the point where their average cost is a minimum. In such cases, N and T, at the point where the cost per day is a minimum in each case, can be determined, and the rods can be compared by using the formula:

$$\text{Average cost, } A_c = \frac{0.7C + C_r N}{T}$$

Interest and other charges need not be considered unless the investment C is quite different in each case and the interest rate i is high. The formula shows that the number of failures at which the rods should be discarded will vary with the cost of making replacements. If the cost of making replacements is low, the rods should be used for a relatively long time; whereas if replacement costs are high, the rods should be replaced early. Also, more expensive rods can be operated for longer periods of time than the less expensive rods.

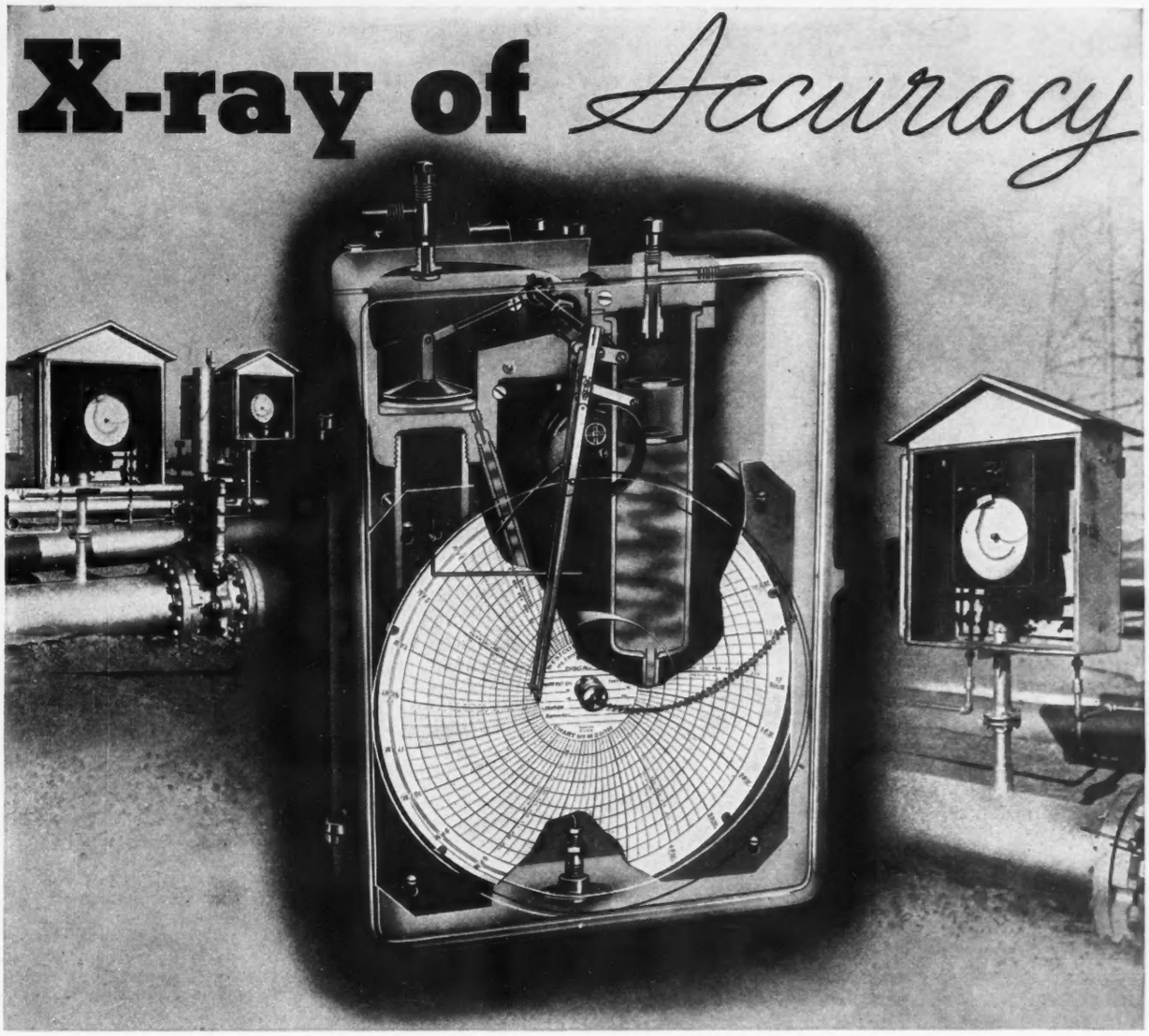
Application of the Formula for Economic Life of Rod Strings

In order to make equation (8) more easily applicable Figure 3 has been constructed. For convenience, the scale for m has been placed on the bottom, thus requiring more trouble in locating the value of N; but, since N has no practical significance (unless expressed as a whole number) the diagonal scale has been made for N.

To use the chart, enter on the bottom of the scale at the value of C = initial value of rod string; trace up to

(*Continued on page 70*)

X-ray of *Accuracy*



EXAMINE WHAT IT IS that makes Westcott orifice meters appeal to the man out in the field . . . the meter engineer who sees the difference between instruments in terms of the number of adjustments and the maintenance necessary to **KEEP** them accurate!

Notice the **SIMPLICITY** of Westcott meters . . . There's only one moving part between the surface of the mercury and the chart record.

Note too the large float area, with wide clearances eliminating loss of accuracy due to dirt collecting on the mercury . . . the low angle of travel of the float . . . and the small angular travel of the static tube. They make the Westcott meter a **PRACTICAL** instrument, insuring not only accuracy but ruggedness and complete reliability.

There are a score of minor refinements as well, all of which come under the heading of good instrument making . . . including accurate machining and honing. Meter men take them for granted in Westcott meters . . . but without them the most advanced features of design still could not produce a Westcott meter.

New literature gives complete data. It will be mailed on request. Also, information on the new popular Round Case Indicating Flowmeter.

AMERICAN METER CO. CENTENNIAL 1836-1936

AMERICAN METER COMPANY
INCORPORATED
Measurement and control of Gas, Oil, Steam, Air and Liquids
ESTABLISHED 1836
METRIC METAL WORKS • ERIE, PENNSYLVANIA
342

DEGREE OF REDUCTION OF SEDIMENTS IN THE EAST TEXAS BASIN AS AN

Index of Source Beds

By PARKER D. TRASK, U. S. Geological Survey, Washington, D. C., and W. ROSS KEYTE, Midland, Texas.

THE American Petroleum Institute and the U. S. Geological Survey for the past several years have been undertaking an investigation of source beds. Source beds are the rocks in the ground that contain substances from which petroleum has been or can be generated. In prospecting for oil it is of distinct financial advantage to the oil operator to know the extent to which oil-forming rocks are present in the areas in which he is interested. The main object of this investigation on source beds is to develop criteria which will enable a geologist to recognize oil-forming rocks and thus help in lessening the cost of finding oil.

In this work several possible means of recognizing source beds have been considered,[1] but for the past 18 months attention has been concentrated on the degree of reduction of the sediments. The degree of reduction is a rough index of the oxygen content of the organic matter in the sediments. Petroleum consists of compounds low in oxygen and high in hydrogen. The materials from which it is generated, accordingly, may be expected to be relatively rich in reduced substances, i.e., in substances of relatively low oxygen content. An attempt is being made at present to ascertain if the state of reduction of sediments may be used as an index of source beds.

In such work it would be highly desirable to analyze sediments definitely known to be source beds to see if they actually are reduced in comparison with ordinary sediments, but unfortunately no beds are known with absolute certaintity to be source beds. At present the assumption is being made that sediments associated with oil zones, or which lie in or near the same stratigraphic zones as those in which the oil is found, ordinarily are source beds. As a general rule, this assumption seems reasonable; because the nearer a favorable reservoir is to the source of the oil, the greater is the liklihood that oil will accumulate in it. However, petroleum by no means will invariably accumulate near its place of origin. Thus any attempt to use beds associated with oil zones as source beds may lead to anomalous results. Some sediments associated with oil zones may never have yielded any oil, and other sediments associated with barren zones may have generated much oil which has migrated to other rocks. Moreover, the sediments adjacent to the oil zones may vary in their capacity to generate oil, and the sequence of sediments that are arbitrarily assumed to be close enough to the oil zones to be sources of oil may contain a considerable proportion of beds that are not source beds.

THE research project on source beds, sponsored jointly by the U. S. Geological Survey and the American Petroleum Institute has for the past 18 months constituted a study of the degree of reduction as an index of source beds. As indicated in a previous paper on this same subject presented before the Institute at the Los Angeles meeting, this index has to be tested in several petroliferous provinces before its value can be definitely ascertained. Thus far it has been found to prevail in two petroliferous regions, viz., the Rocky Mountains and the Mid Continent; as sediments regarded as source beds in these areas have been observed commonly to have a relatively high degree of reduction. In this paper this relationship is extended to the East Texas basin, as most of the sediments associated with oil zones there in general have been found to have a comparatively high degree of reduction. The relationship, as in other areas, however, has not been observed to hold invariably. Each succeeding area in which the relationship is found to prevail strengthens the probability that it is real and not anomalous. If it is found to hold in the three remaining petroliferous provinces that are now being studied, viz., California, Gulf Coast, and Appalachian, the probability will be strong that it is a true relationship, with the result that it can be recommended to geologists for consideration in prospecting for oil.

The paper was presented before the Sixth Mid-Year Meeting of the American Petroleum Institute, Mayo Hotel, Tulsa, and is published by permission of the Director of the U. S. Geological Survey. Statements and opinions expressed are those of the author, and should not be construed as an official action or opinion of the Institute or of this publication.

Thus if a few areas are studied in this manner, the laws of chance might operate in such a way that the significance of certain characteristics of source beds might be masked; but if a large number of producing areas from several petroliferous provinces are investigated, the law of averages should prevail, and the real significance of the particular characteristics should become apparent (provided, of course, the basic assumption is correct, viz., that the sediments associated with oil zones are the main source of oil in those zones).

The relationship of the degree of reduction of the sediments to the occurrence of oil has already been investigated in a preliminary way in two petroliferous provinces: 1, Wyoming and Colorado;[2] and, 2, Oklahoma and Kansas.[3] In Wyoming and Colorado

CLARK SUPER 2 ANGLE COMPRESSOR

See

THIS COMPRESSOR AT THE EXPOSITION

CLARK

CLARK BROS. COMPANY, OLEAN, NEW YORK, U. S. A.

Export Office: 30 Rockefeller Plaza, New York. Midcontinent Sales Offices and Warehouses: Tulsa, Okla., Dallas and Tyler, Tex. West Coast Office: Smith-Booth-Usher, 2001 Santa Fe Av., Los Angeles. Foreign Offices: 72 Turnmill St., E. C. 1, London, England. 4 Str. General Poetas, Bucharest, Roumania.

See the LONGER LIFE CHAIN

BALDWIN SUPER SERVICE OIL FIELD CHAIN WILL BE ON EXHIBITION AT SPACES 9 AND 10 AT THE INTERNATIONAL PETROLEUM EXPOSITION, TULSA, MAY 16th TO 23rd.

Baldwin Super Service Chain is precision made of finest alloy steel; side bars heat-treated for strength and resiliency; rollers machined from solid steel; pins and bushings hardened and ground to size. See it. Note the design and the accurate fit. You'll see why it is the experienced driller's first choice for tough, deep holes. Available in A.P.I. No. 3 and A.P.I. No. 4 sizes.

FOR SALE IN ALL OIL FIELDS

BALDWIN-DUCKWORTH CHAIN CORPORATION
SPRINGFIELD, MASSACHUSETTS

Factories at Springfield and Worcester, Mass.
Factory Representative: Geo. J. Fix, Dallas, Texas.
Export Department: Oil Industry Appliances Co., 39 Cortlandt St., New York City, N. Y .

BALDWIN
ASK THE DRILLER--HE KNOWS

the oil zones are more commonly associated with sediments having a high degree of reduction than they are with sediments having a low degree of reduction. In Oklahoma and Kansas a similar relationship was observed; very few formations in which the degree of reduction is high are associated with barren zones, and few in which it is low are associated with producing zones.

The object of this paper is to discuss the relationship of the degree of reduction in another petroliferous province, viz., the East Texas basin. It has not yet been possible to complete the analyses of the 3300 samples that have been collected from this region, but the data that have thus far been obtained are presented in order to make a preliminary appraisal of the reliability of the relationship of high-degree reduction to the occurrence of oil in this general region.

Methods of Analysis

As the methods of analysis have been discussed previously,[4] they are not described in detail here. The measure of the degree of reduction that is used is a ratio of the reducing power to the organic content of the sediments. The reducing power is expressed in terms of the number of cubic centimeters of 0.4 *n*chromatic acid that can be reduced by 100 milligrams of sediment. The organic content ordinarily is estimated from the carbon or nitrogen content. This would be a satisfactory procedure if the proportion of carbon and nitrogen in the organic constituents were constant; but, as these elements vary in amount in the organic constituents of different sediments, they cannot be used as absolute measures for the organic content. Carbon is present in much larger quantity, and presumably is less variable, than nitrogen.[5] The carbon content, therefore, is a better measure for indicating the organic content.

However, for preliminary studies, nitrogen is more satisfactory to use. The method for analyzing nitrogen is four times faster than carbon, and the probable error of individual analysis is only one-fourth as much as for carbon. Thus, when a general appraisal of a large group of sediments is desired, these advantages considerably more than offset the disadvantage of nitrogen being a less reliable index of the organic content. The degree of reduction, therefore, in this paper is considered in terms of the ratio of the reducing power to the nitrogen content—although, to accord with previous practice,[6] the inverse form of the ratio, viz., the nitrogen content divided by the reducing power, is used. This nitrogen-reduction ratio is a very definite empirical entity; and, despite the fact that it may not be a completely reliable index of the state of reduction of the sediment, is a very convenient characteristic of sediments to study in connection with source beds.

The lower this nitrgen-reduction ratio is, in general, the greater is the degree of reduction (variations in the proportion of nitrogen in the organic matter not being considered). The ratio is presented in the form of 100 times the percentage of nitrogen divided by the reducing power. This ratio ranges mainly between 3.0 and 9.0 in the sediments that have thus far been analyzed, and the average is of the order of magnitude of 6.0. As the program of analyses planned for the East Texas basin is not yet completed, numerical data are not given in this paper. Instead, the results are presented in terms of deviation from the average ratio. If the ratios are significantly less than the average, the sediments are regarded as having a high degree of reduction; and if they are distinctly greater than average, the sediments are considered as having a low degree of reduction.

TABLE 1

Generalized Nature of Formations in the East Texas Basin That Are Considered in This Report

	(Feet)
EOCENE	
Wilcox formation: Sandstone, shale, and lignite, thickness increases southeastward	1000±
Midway group: Shale, sandy shale, and minor beds of sandstone and limestone	800±
UPPER CRETACEOUS	
Navarro group: Mainly gray shale and marl. Thins eastward. Nacatoch sand, 200± feet thick lies in central part of group, and in places carries oil and gas	600±
Taylor marl: Consists mainly of marl, but in places contains considerable chalk. Sands associated with the chalky part of this formation carry gas and oil in some areas. Formation thickens toward center of basin	800±
Austin chalk: Mainly chalk; thickness decreases eastward. In east part of basin formation is approximately 125 ft. thick, and rests with slight angular unconformity on underlying strata	300±
Eagle Ford shale: Mainly dark calcareous shale. Thickness decreases eastward. Formation is not present in East Texas field	300±
Woodbine sand: Mainly sand, but contains some shale and ash zones. Thickness increases toward center of basin; main oil zones of this area occur in the Woodbine sand. The combined thickness of Eagle Ford shale and Woodbine sand in center of East Texas basin may be as great as 1000 ft.	300±
LOWER CRETACEOUS	
Washita group: Mainly limestone, but contains some shale in upper part. Carries small amount of gas in places	300±
Fredericksburg group: Mainly limestone, but contains some calcareous shale in lower part. Carries oil and gas in places	500±
Trinity group: Consists of three formations—the upper and lower are dominantly sand with minor amounts of shale; the middle is dominantly limestone. All three formations carry gas and oil in areas around the edges of the East Texas basin	1000±

Geologic Relations

The East Texas basin is a structural basin situated in Northeast Texas in the area shown in Figures 1, 2, and 3. The formations from this area that are discussed in this report range in age from early Lower Cretaceous to Lower Eocene.[7] The general nature of these formations is indicated in Table 1. The thicknesses given in this table indicate only the general order of magnitude; most of the formations vary in thickness throughout the area—and in a preliminary paper such as this it is impracticable to discuss in detail the changes in thickness. In general, the Tertiary formations thicken southeastward, and the Cretaceous formations thicken toward the center of the East Texas basin. A few anticlines are found in the basin, several of which presumably are due to intrusions of salt. Some of these anticlines, such as the area around the Van field, probably were in existence in Cretaceous time, as is indicated by the thinning of the sediments on the crest of the anticline.[8] The western part of the basin is cut by a series of normal faults (Figures 1, 2 and 3)

some of which are associated with oil fields. This faulted area is called the Mexia fault zone.

Oil and Gas

Oil and gas are found in several horizons throughout the East Texas basin.[9] The main producing horizon is the Woodbine sand. This formation yields oil in the East Texas and Van fields and in several areas in the southern part of the Mexia fault zone. The Woodbine does not contain oil in apparently favorable structures in the northern part of the faulted area or in the Kelsey structure, 15 miles northwest of the northern end of the East Texas field.

Sands in the Navarro and Taylor formations in the Upper Cretaceous have yielded minor quantities of oil in several places in the south end of the faulted area shown in Figures 1, 2, and 3. The Fredericksburg group of Lower Cretaceous age produces oil in the Luling area about 100 miles southwest of the areas shown in Figures 1, 2, and 3. The Trinity yields oil and gas in the Rodessa field of Caddo Parish (Louisiana) and adjacent Marion County (Texas); oil in Titus and Franklin counties (Texas); gas in the Cayuga field of Anderson County (Texas) and oil in small fields west of the East Texas basin. The Eocene yields a small amount of oil in two or three fields in the East Texas basin south of the area shown in Figure 1, and produces much oil in the Coastal region still farther south. None of the samples examined in connection with this report came from areas in which the Eocene is oil-bearing.

Gas has been encountered in all the formations listed above in which oil has been found. In addition, parts of the Washita group have yielded minor quantities of gas in a few areas.

Samples Studied

This report is based on 3300 samples from more than 50 wells. Upon the basis of preliminary analyses which indicated the general nature of the sediments, 750 samples were chosen for determination of the nitrogen-reduction ratio. About one-half of these samples come from various parts of the East Texas basin, and represent the Austin chalk, the Eagle Ford shale, the Woodbine sand, and the upper part of the Washita group. The other half come mainly from the vicinity of the East Texas field, and represent formations ranging from Eocene to Lower Cretaceous. The locations of the samples are indicated in Figures 1, 2, and 3.

Data on the organic content and volatility of these sediments have been presented in a previous report.[10] In general, they contain between 1.5 and 4 percent organic matter. The Eagle Ford shale has the maximum amount; it contains from 2 to 4 percent organic matter throughout most of the area. The content is greatest in the center of the East Texas basin, and it is also high in the vicinity of the oil fields in the southern part of the faulted area on the west side of the basin. The organic content of the Austin chalk and Woodbine formation likewise tends to increase toward the southwest side of the basin. The volatility of the Eagle Ford shale similarly is greatest in the southwest part of the area. Thus the sediments associated with the oil zones in the southwest part of the basin are relatively rich in organic matter and in volatile constituents compared with the sediments in the barren area farther north.

The nitrogen-reduction ratio was averaged for each formation encountered in the wells from which samples were obtained. The results were plotted upon maps, and lines were drawn separating areas in which the ratio was higher from those in which it was lower than the general average for that formation. The areal distribution of the nitrogen-reduction ratio for three of the formations is shown in Figures 1, 2, and 3, viz., the Austin chalk, Eagle Ford shale, and Woodbine sand. Insufficient data are available to warrant the presentation of maps for the other formations. Data for other formations, along a north-south section in the east part of the field, however, are presented in Table 2. This section includes the Monitor Merrell well 30 miles north of the East Texas field, the Amerada Petroleum Corporation Wade well on the Kelsey structure 15 miles northwest of the field, the Sinclair Prairie Oil Company Holland 4 well near the south end of the East Texas field, and the Sinclair Prairie Oil Company McRae 1 well a few miles south of the field (Figure 3). A well from the Van field in the north-central part of the basin is also included in the table.

Areal Distribution of Ratios

Possible Sources of Oil

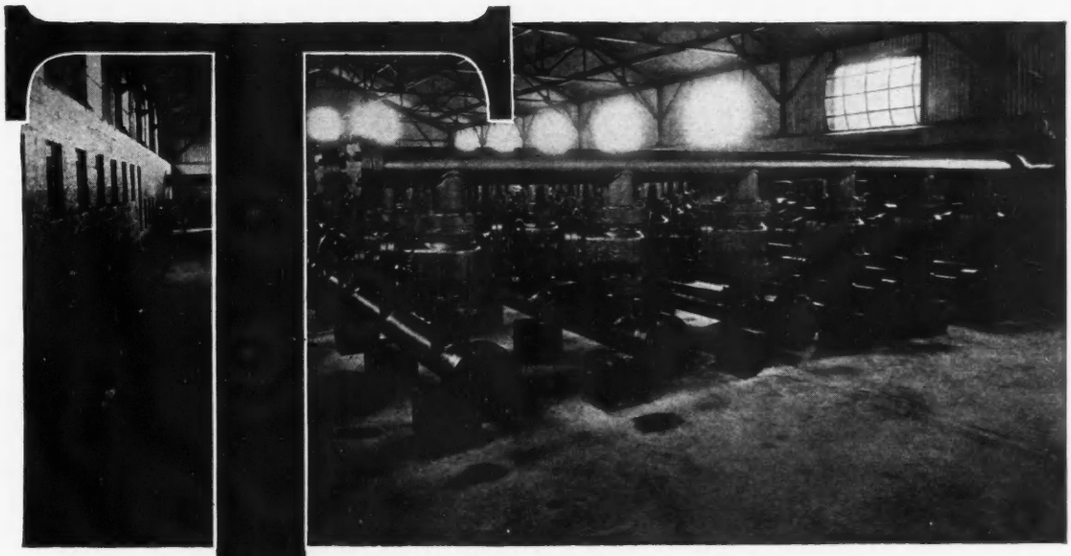
The sediments considered as the principal sources of most of the oil in the East Texas basin are the Austin chalk, Eagle Ford shale, Woodbine sand, and Washita group. The Eagle Ford shale—because of its dark color, bituminous nature, and position immediately overlying the Woodbine sand—has commonly been regarded as a major source of oil. The Eagle Ford shale, however, pinches out on the east side of the basin, and is not present in the immensely productive East Texas field; but it is possible for oil to have migrated up the dip into the field from places where the Eagle Ford is present.

The Woodbine formation itself contains considerable shale, which might be a source of the oil now found in the formation. The underlying beds of the Washita group, consisting of shale and limestone, also might be a source of oil in the Woodbine sand. The Austin chalk overlies the Woodbine within the East Texas field, and also over a considerable area west of the field from which the oil might have been drained. The oil in the East Texas field, therefore, possibly might be derived from the Austin chalk. Thus in consideration of the geologic relations of the formations, the order of importance of the sediments as source beds would be: 1, Eagle Ford; 2, shale in Woodbine formation; 3, limestone and shale of the Washita group; 4, Austin chalk; and, 5, other formations. The distribution of the nitrogen-reduction ratio among the formations, accordingly, will be taken up in that order.

Eagle Ford Shale

The nitrogen-reduction ratio of the Eagle Ford shale, in general, is less than 6.0, and the average is 5.1. The sediments throughout almost the entire areal extent of the formation, as indicated by the available samples, therefore, have a relatively high degree of reduction. The data, therefore, in general, support the concept that sediments in which the nitrogen ratio is low are likely to be source beds.

The formation has the highest degree of reduction in a belt extending in a northeasterly direction across the south-central part of the East Texas basin (Figure 1). The producing areas in the fault-lime field lie within the belt of maximum reduction. The



Test their ease of operation...their long life and ultimate economy

Year in and year out, dependability, ease of operation and the exceptional ability to stay tight make Darling Gate Valves the choice of leading operators and refiners.

Uneven wear is obviated by the rotating disc feature which permits the valve to seat in a new position with every closing. Those who make careful comparisons usually answer the valve question by specifying Darling—the Gate Valve that endures.

DARLING VALVE & MFG. CO.
Williamsport, Pa.

NEW YORK — OKLAHOMA CITY — HOUSTON

Mid-Continent Distributors:
International Supply Co.
Moorlane Company

California Distributors:
Hickey Pipe & Supply Company
3375 East Slauson Ave.,
Los Angeles, Calif.

DARLING
GATE VALVES

average ratio in the producing areas in the faulted district is 4.6 compared with 5.5 in the barren areas lying farther north. The lower ratio, together with the greater organic content and greater volatility in the producing areas, compared with the barren areas, may possibly indicate that the Eagle Ford shale is a better source bed in the southern part of the faulted area than in the northern. The Eagle Ford does not extend as far as the East Texas field, but the nitrogen-reduction ratio is relatively low throughout the area in which it is possible that the Eagle Ford may have supplied oil to the East Texas field.

The ratio in the one well that was examined from the Van field is 5.3, which is only slightly less than the average of 5.5 for the northern part of the faulted area to the west. Thus, although the higher ratio in the northwest part of the basin compared with the southwest part is in accord with the concept of poorer source beds in the northwest area, the small difference between the ratios in the Van field and in the northwest part of the basin, together with the fact that with respect to sediments in general the ratio in the northwest part of the basin is relatively low, indicates that the Eagle Ford should not be disregarded as a source bed in the northwest part of the basin.

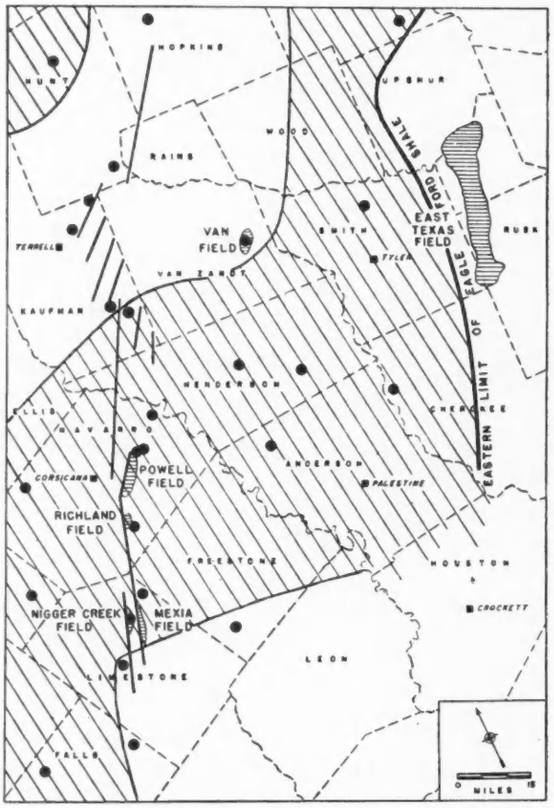


FIGURE 1
Nitrogen-Reduction Ratio for the Eagle Ford Shale.
Shading indicates areas in which the nitrogen-reduction ratio is lower than the average for the formation. Wells from which samples were obtained are shown by dots.

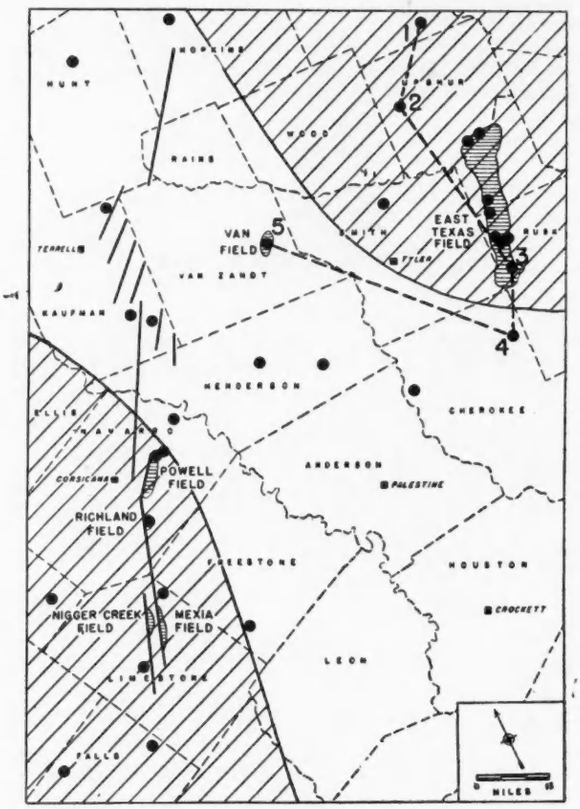


FIGURE 2
Nitrogen-Reduction Ratio for the Woodbine Sand.
Shading indicates areas in which the nitrogen-reduction ratio is lower than the average for the formation. Wells from which samples were obtained are shown by dots.

Woodbine Sand

The average nitrogen-reduction ratio of the Woodbine sand is approximately 5.5, which is slightly less than the average for sediments in general. The ratio is less than 5.5 in a wedge-shaped area in the western side of the East Texas basin and in the vicinity of the East Texas field (Figure 2). The area of low ratios on the west side of the basin lies partly in producing territory and partly in barren territory. The area extending westward into the basin from the East Texas field, from which a large part of the oil in the field could be derived if the Woodbine were the source, has a low ratio near the field and a high ratio away from the field. Thus the data on the distribution of the nitrogen-reduction ratio in the Woodbine formation in the East Texas basin, on the assumption that the Woodbine is the source of the oil, are not particularly conclusive, one way or the other, as to the reliability of the ratio as an index of source beds. There is, however, a tendency for the sediments in the vicinity of the known oil pools to have lower ratios. The East Texas, Powell, and Richland fields lie in areas of low ratio. The Nigger Creek and Mexia fields lie close to the dividing line between high and low areas; and the Van field, from which no Woodbine samples are available, lies only 15 miles north of the dividing line.

Washita Group

The Washita group, because of its location beneath the producing zones in the Woodbine sand, has not been explored as much as the overlying formation. Consequently, relatively few samples have been obtained from it. The available data seem

AFTER RUNNING YOUR FIRST STRING OF *Chester Special Casing* YOU BECOME A BOOSTER

Almost daily we receive reports from the field commending us on the fast running of *Chester Casing*. This is due to our accurate threading which tends to make a fast running and perfect joint.

Chester Casing **has a minimum of 40,000 pounds elastic limit—70,000 pounds tensile per square inch and a hardness of 145 Brinell.**

A Few Reports That Come In

One hour's time saved in running string over other makes.

●

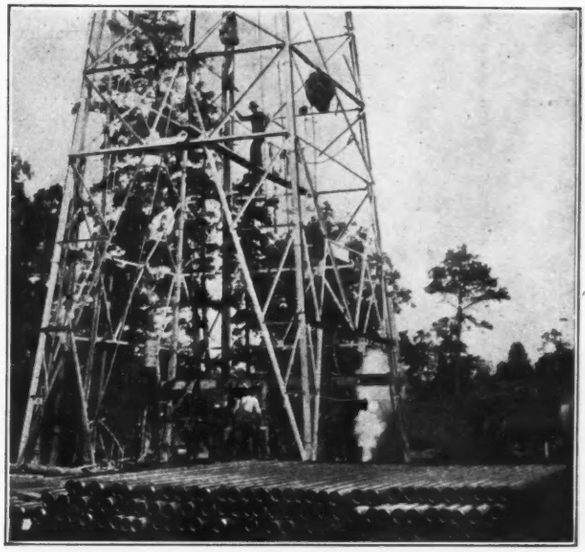
Customer said "We are well pleased with the accurate threads."

●

Not over a half thread variation in the whole string in making up.

●

Superintendent reported "The most perfect joints we ever ran."



A Few Reports That Come In

Another Tool Pusher said "Am well pleased with it and it was a beautiful string."

●

Tool Pusher — "Never ran nicer Casing."

●

General Superintendent well pleased with reports from his field men regarding easy running of Chester Casing.

●

Another was skeptical—now a booster.

SOUTH CHESTER TUBE CO.

Chester, Pennsylvania

District Sales Managers

W. E. Gibson, 801 Columbia Bank Bldg., Pittsburgh, Pa.
J. P. Cooney, 715-716 A. G. Bartlett Bldg., Los Angeles, Calif.
J. P. Steele, 603 Petroleum Bldg., Fort Worth, Texas.

District Offices

South Chester Tube Co., 1708 Hudson Terminal Bldg., 30 Church St., New York, N. Y.
J. D. Swartz, 608 Beacon Bldg., Tulsa, Oklahoma.
E. L. Moseley, 2218 Mills St., Houston, Texas.
Burt S. Shafer, Southwest Representative, 4313 Fairfax Ave., Dallas, Texas, or 603 Petroleum Bldg., Ft. Worth, Tex.

District Warehouses

Houston, Texas; Thenard, Calif.; San Francisco, Calif.

Distributors

Western Supply Co., Tulsa, Okla. and Branches.
International Supply Co., Tulsa, Okla., and Branches.
Dunigan Tool and Supply Co., Breckenridge, Texas, and Branches.
Bridgeport Machine Co., Wichita, Kansas, and Branches.
Producers Supply and Tool Co., Marietta, Ohio; Fort Worth, Texas, and Branches.
Louisiana Supply Co., Sulphur and Brimstone, La.
Oil Field Equipment Co., San Antonio, Texas.
Okmulgee Supply Corp., Okmulgee, Okla., and Branches.
Stephen H. McCabe, 508 4th St., San Francisco, Calif.
Viking Automatic Sprinkler Co., 114 Sansome Street, San Francisco, Calif.
Herley Supply Co., 3006 Cherry Ave., Long Beach, Calif.
Barde Steel Co., Seattle, Wash., and Portland, Ore.
Star Drilling Machine Co., 550 Clinton St., Portland, Ore., and Akron, Ohio.
The Atha Supply Co., Zanesville, Ohio, and Mt. Pleasant, Mich.
United Pipe & Supply Corp., Charleston, W. Va., and Branches.
Bovaird & Co., Bradford, Pa.
Kane Supply Co., Kane, Pa., and Branches.
Prichard Supply Co., Mannington, W. Va., and Branches.
LeValley, McLeod, Kinkaid Co., Elmira and Olean, N. Y.

CHESTER

STEEL CASING AND LINE PIPE

to indicate the average nitrogen-reduction ratio is slightly less than 6.0. Thus the results from the Washita group convey no distinctive implication, one way or the other, with respect to the degree of reduction being an index of source beds.

Austin Chalk

The nitrogen-reduction ratio in the Austin chalk averages slightly less than 6.0. The Austin is characterized by two areas of low ratios—one in the southwest part of the basin, and the other in the northeast part (Figure 3). The Austin chalk throughout the East Texas basin is barren of oil, and is characterized by high nitrogen-reduction ratios—except in the areas in which the Woodbine produces oil, viz., in the vicinity of the East Texas field, where the Woodbine formation directly underlies the Austin

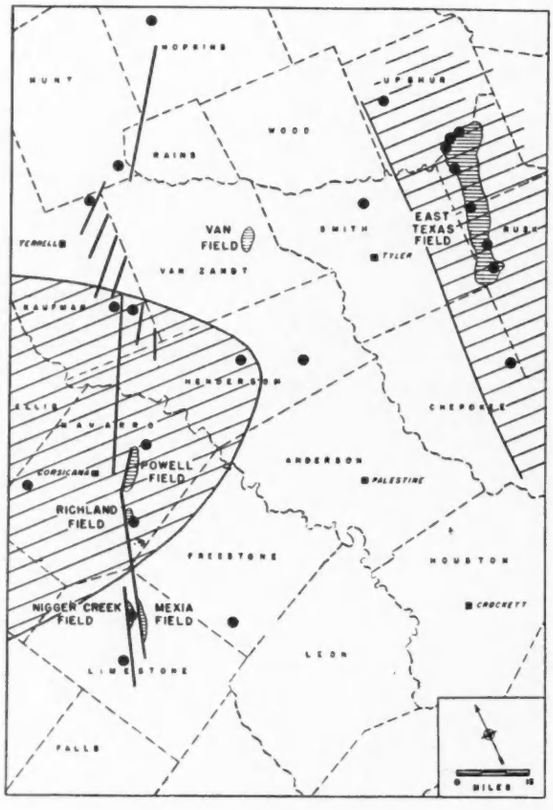


FIGURE 3

Nitrogen-Reduction Ratio for the Austin Chalk. Shading indicates areas in which the nitrogen-reduction ratio is lower than the average for the formation. Wells from which samples were obtained are shown by dots. Numbers show location of wells represented in Table 2.

chalk, and in the southern part of the Mexia fault zone. The ratio also is low in the vicinity of Bastrop County 50 miles southwest of the area shown in Figure 2, where oil is found in the Austin chalk. The low ratios in the Austin chalk in the vicinity of the East Texas field and in the area around Bastrop County, if low ratios are an index of source beds, suggest that the Austin chalk might be the source of oil in these two areas. The similarity in composition of the oil in the two areas, as pointed out by Barton,[11] likewise supports the same hypothesis.

Other Formations

The nitrogen-reduction ratios of the other formations are summarized in Table 2. The locations of the wells represented in Table 2 are shown in Figure 3. The Wilcox formation is represented by two wells: the Merrell well 30 miles north of the East Texas field, and the Holland well in the southern part of the field. The Wilcox has a low ratio in both these places, but no oil has been found in the Wilcox formation in

TABLE 2

Nitrogen-Reduction Ratio of Eocene and Cretaceous Formations in Northeast Part of the East Texas Basin

Formation	Well 1	2	3	4	5
	Nitrogen-Reduction Ratio				
Wilcox	—	..	—	..	..
Midway	+	..	+	0	..
Navarro	+	..	+	+	0
Taylor	—	..	+	+	—
Austin	—	—	..	+	0
Eagle Ford	—	..	..	..	—
Woodbine	..	—	—	..	..
Washita	..	—	..	..	..
Fredericksburg	..	0	..	..	..
Trinity	..	0	..	..	..

Location of wells is indicated in Figure 3. No. 1 is Monitor Merrell 1; No. 2 is Amerada Wade 1 from the Kelsey structure; No. 3 is Sinclair Holland 4; No. 4 is Sinclair McRae 1; and No. 5 is a well from the Van field. The nitrogen-reduction ratios are given in terms of deviations from averages; —, is less than 5.5; 0, between 5.5 and 6.5; and + greater than 6.5.

their vicinity. The Wilcox formation contains numerous sand bodies; and it seems that, if the Wilcox contained source beds, oil should have been found in it. The Wilcox formation, therefore, apparently represents a group of sediments in which a low nitrogen-reduction ratio is not an indication of source beds—although two wells is hardly sufficient to lead to generalizations about the whole formation.

The nitrogen-reduction ratio of the Midway group decreases progressively from north to south, but it is higher than 6.0 in all three wells from which samples have been analyzed. As no oil has been found in the Midway deposits in this area, the data support the concept that a high ratio is an indication of unfavorable source beds.

The Navarro group has a ratio distinctly above the average on the east side of the basin, and slightly below average in the Van field. The ratio, therefore, seems to decrease westward. The Navarro carries oil in some of the faulted areas on the west side of the basin. This lower trend of the ratio westward, consequently, is in accord with the concept of a low ratio being a favorable indication of source beds.

The Taylor marl has a high ratio in the south end of the East Texas field; and a low ratio in the Merrell well 30 miles north of the field, and in the Van field 45 miles west of the field. Oil has been found in sands associated with the Taylor marl in the western part of the basin. The trend toward lower ratios westward favors the idea that low ratios are a characteristic of source beds.

The lower Cretaceous formations have been reached in only one of the five wells represented in Table 2, viz., the Wade well 15 miles northwest of the East Texas field. No oil was found in this well. The nitrogen-reduction ratios in all the formations

A complete line of the most advanced drilling and production equipment in petroleum history . . . for wells of ANY depth.
EMSCO
"QUALITY FIRST"
D+B
TRADE MARK
EMSCO
A Complete Line of Better Oil Well Equipment
You are cordially invited
to visit us and inspect these modern improved products at the
Continental Supply Company Booth
Ninth International Petroleum Exposition
Tulsa, Oklahoma . . . May 16-23, 1936
EMSCO DERRICK & EQUIPMENT COMPANY
D+B PUMP & SUPPLY COMPANY
Division of Emsco Derrick & Equipment Company
LOS ANGELES NEW YORK LONDON DALLAS HOUSTON

are approximately the same as for the average of sediments in general. The ratio is lowest in the Washita group, where it is 5.4. As the nitrogen-reduction ratios are so close to the general average ratio for sediments, no definite inferences can be made as to their reliability in indicating the ability of these Lower Cretaceous sediments to generate oil.

Conclusions

The data from the East Texas basin presented in this paper, in general, seem to support the concept that a low nitrogen-reduction ratio is a favorable indication of source beds, and a high ratio an unfavorable indication. Summarizing the relationships by formations, we find that it is unfavorable in the Wilcox; favorable in the Midway, Navarro, Taylor, Austin, and Eagle Ford; neutral, or perhaps slightly favorable, in the Woodbine and Washita; and neutral in the Fredericksburg and Trinity. The relationship, in general, is most favorable in those formations for which the most data are available. It, accordingly, seems probable that a definite relationship between low nitrogen-reduction ratios and sediments associated with oil zones prevails in the East Texas basin. The relationship, therefore, has thus far been found to prevail in three oil regions: the Rocky Mountains, the Mid Continent, and the East Texas basin. It is still possible, however, that this relationship may be apparent and not real; but each successive area in which it is found to hold strengthens the probability that it is real.

The relationship at present is being studied in three other petroliferous provinces; and if it is found to prevail in each of them, the probabilities will be very great that it is a real relationship and, therefore, can be recommended to geologists as a practical tool in their search for petroleum. It should be borne in mind, however, that in each of the three regions which have already been examined, the relationship has not been found to hold universally. Consequently, the nitrogen-reduction ratio probably can never be expected to be an absolute index of source beds. Nevertheless, the chances now seem good that it may turn out to be a useful means of segregating sediments that are more likely to be source beds from those that are less likely to be source beds; and, if so, it should prove of economic value to the petroleum industry.

Acknowledgments

This paper represents joint work of the two authors. Trask wrote the paper and outlined the work. Keyte collected the samples, obtained the data on correlation of the samples, and made some of the chemical analyses. The analyses, however, were made mainly by H. E. Hammar, J. L. Stimson, R. W. Gillespie, R. V. Hughes, G. D. Johnson, and H. W. Patnode. Patnode, in addition, assisted in compiling the data and in preparing the figures. The analyses were made in the laboratories of the Division of Chemistry, National Bureau of Standards, Washington, D. C., and of the Engineering Department of Tulsa University, Tulsa, Okla. The writers appreciate greatly the friendly attitude of E. Wichers and R. L. Langenheim in connection with this laboratory work. Acknowledgment is due many officials of oil companies for their courtesy in supplying samples and aiding Keyte in correlating the samples.

Bibliography

[1] P. D. Trask and H. E. Hammar, "The Degrees of Reduction and Volatility as Indices of Source Beds," *Drilling and Production Practice, 1935,* American Petroleum Institute, New York (1936).

[2] *Idem.*

[3] P. D. Trask, "Some Studies of Source Beds in Oklahoma and Kansas," *Bull. Amer. Assoc. Petroleum Geol.* **20** (1936).

[4] P. D. Trask and H. E. Hammar, *op. cit.*

[5] P. D. Trask, "The Problem of Petroleum Generation," *Bull. Amer. Assoc. Petroleum Geol.* **20** (1936).

[6] P. D. Trask and H. E. Hammar, *op. cit.*

[7] For details, see H. E. Minor and Marcus A. Hanna, "East Texas Oil Field," *Bull. Amer. Assoc. Petroleum Geol.* **17,** 757-92 1933; G. C. Matson and O. B. Hopkins, "The Corsicana Oil and Gas Field, Texas," *U. S. Geol. Survey Bull.* **661,** 211-52 (1917); Gayle Scott, "The Cretaceous of Texas," XVI *Intern. Geol. Cong. Guidebook* **6,** 46-61 (1933); Henry A. Ley and K. M. Wilson, "Gas Fields in Northeast Texas Embayment," *Geology of Natural Gas,* Tulsa, 651-81 (1935); F. H. Lahee, "Oil and Gas Fields of the Mexia and Tehuacana Fault Zones"; *Structure of Typical American Oil Fields* 1, Tulsa, 304-8 (1929); E. H. Sellards, W. S. Adkins, F. B. Plummer, "Geology of Texas, vol. 1," *Univ. Texas Bull.* **3232,** 259-606 (1932).

[8] W. E. Wrather, "The Van Oil Field," *XVI Inter. Geol. Congr. Guidebook* **6,** 64 (1933).

[9] R. B. Kelly and P. R. Martin, "Petroleum in the Central Texas Area During 1934," *Petroleum Development and Technology,* 1935, *Trans. Amer. Inst. Mining Met. Eng.* **114,** 379-87 (1935); A. R. Dennisson, "Development and Production in the East Texas District," same publication, 388-93.

[10] P. D. Trask and H. E. Hammar, "Organic Content of Sediments," *Drilling and Production Practice,* 1934, American Petroleum Institute, New York, 126-8 (1935).

[11] D. R. Barton—Remarks made in paper presented at roundtable discussion sponsored by the Research Committee of the American Association of Petroleum Geologists, March 18, 1936.

The Economical Life of Sucker Rods

(*Continued from page 58*)

C_r = the cost of replacing a broken rod; and then trace across until this line intersects the vertical line for the particular value of m to be used, and read the value of N. In the example shown on the chart, $C = 600$, $C_r = 20$, $m = 3$, and the value of N is found to be *11.*

Figure 4 shows how the economic failure varies with the economic factor $\frac{0.7C}{C_r}$, and with m. Figure 5 shows the number of failures at which the cost per day equals the cost per day at the time of the first failure. This value has little significance, and has been included as being of casual interest only.

Table 1 shows a numerical example based on the rod-failure curve shown in curve No. 4 (Figure 1). The number of failures at which the cost will be a minimum has been taken as the one above where the intersection occurred. For this reason, the economic limit for $C_r = 30$ appears to be the same as the cost at the first failure. The rod string, for purpose of comparison, has been assumed to be thrown away at the end of 15 failures, or at the end of 200 days; and the amount that would have been saved by replacing the rods at the economic limit is shown in the last column for different values of C_r. It is seen that little saving can be made if C_r is small, but the saving becomes quite large as C_r increases. These examples show, in a very general way, how the formulas can be applied; but do not attempt to set any definite limits. These will depend on the various economic factors which vary from district to district.

The writer wishes to express his appreciation to R. J. S. Pigott and B. B. Wescott for their helpful discussions on this problem, and to P. D. Foote for permission to publish this paper.

Rotary Drilling Practices

By J. E. BRANTLY, President
Drilling and Exploration Company,
Avenal, California

THE author discusses the function and importance of the bit, the weight carried on the bit, rotating speeds, mud-laden fluids, including pumps, and steam pressures and power requirements.

This paper was presented before both the California District meeting (Los Angeles, April 14, 1936) and the Mid-Year meeting (Tulsa, May 14, 1936) of the Division of Production of the American Petroleum Institute. The statements and opinions expressed are those of the author, and should not be construed as an official action or opinion of the Institute or of this magazine.

THIS paper is limited to a brief discussion to those salient points which are most pertinent to and of most importance in the drilling of a well by the rotary system, these being the bit or cutting tool, the weight to be carried on the bit, rotating speeds, and mud-laden fluids—with particular reference to the Kettleman Hills field of California, where probably as great a variety of drilling conditions is encountered as in any other one field. The order given is not the order of importance; because these factors, with one exception, play equal parts in the drilling of a well, and without properly-balanced values between them an efficient operation cannot be had, and the resulting over-all rate of drilling cannot attain its maximum efficiency. It will be assumed that the equipment in use on a given operation is the best available for the particular job to be undertaken. Necessarily, subsidiary subjects must be brought into the discussion, in order that the methods of and means for arriving at the various values of the several factors may be in more or less progressive order and readily understood.

Boilers and Pumps

The most important factor used in the drilling of a well is the mud-laden fluid circulated through the bit, both as to its volume and character. Volume is dependent upon the mechanical equipment of the rig, while physical character should be controlled by the requirements of the formations being drilled.

In order to promote circulation of the fluid through the hole, the rig must contain in its mechanical equipment boilers, pumps, and power for driving the drilling tools. Only steam-power plants will be considered here. Regardless of the job to be done, the depth and size of the hole, the nature of the formations to be drilled, or the equipment to be used, the most important consideration of all is the source of power for the prime movers of the rig, the boiler plant, its horsepower capacity and steam pressure. Without a plant that will deliver steam of the proper pressure in adequate volume, no drilling operation can reach its maximum efficiency. This steam pressure and volume is, or should be, controlled entirely by the volume of mud-laden fluid to be delivered to the bit for maximum drilling efficiency and the type pumping equipment employed. The first problem, then, is to determine this fluid volume. This is most readily ascertained by actual experience in the drilling of wells in a given area; although it may be said, as a generality, that the greater the volume of fluid jetted through the water courses of the bit against the bottom of the hole (within certain critical limits for various sized holes, certain type bits, and various formations) the faster will be the rate of penetration of the bit. If fluid volume be excessive through certain types of bits in certain formations, i. e., some rock bits in hard brittle material, the force of the fluid against the bottom of the hole has a tendency to support the tool. This can be corrected to some extent by properly-directed and -sized fluid courses through the bit. Having determined—or, rather, decided—upon the volume, it then remains to select the pump that will deliver that quantity. Next, the boiler plant capable of producing the necessary volume of steam at the requisite pressure is chosen, and we have the two most important and the fundamental parts of the drilling rig.

Pump and Boiler Combinations

There are several combinations of pumps and boilers which may be used to obtain this necessary fluid volume. The most obvious, and that in most general use, is a pump of the usual type which has the proper capacity at normal speed, and a boiler plant that will deliver steam at that pressure and volume adequate to run the pump at that speed which will displace the desired quantity of mud against the maximum contemplated drilling pressures. In the usual pump the steam-piston diameter is approximately double that of the mud-end piston for the largest size liner, i. e., the steam piston has four times the area of the fluid piston, the pump being capable of putting up a fluid pressure somewhat less than four times the available steam pressure. In areas where the more difficult drilling problems are encountered, a pump of this character necessitates the use of what are considered to be, in oil-field practice, high-pressure boilers—300 pounds to 350 pounds. There are admittedly some disadvantages to high steam pressure around a drilling rig; but when the necessary fluid volume can only be delivered by the use of these high pressures, then they are absolutely essential for efficient operation; and

in the end, with the proper operating methods, the actual cost of such a plant (excepting its first cost) is no greater than for lower-pressure units. The dangers are the same—a boiler that delivers steam at 100 pounds pressure will, if it should explode, kill a man as quickly as one of 350 pounds working pressure. So, briefly, it would seem that there are no logical reasons against the use of high-pressure boilers as such, and, when they are necessary for the work to be done, they should be used.

A question of great importance is that of the use of the super-heater in an oil-field boiler plant. The advantages of super-heated steam over saturated steam, especially at lower oil-field pressures, are quite evident; but the relative advantages of a superheater as against an additional boiler seem to be dependent entirely upon the existing conditions. Without discussing the various reasons involved, it seems apparent that, when the steam-power plant is capable of supplying steam to direct-acting steam pumps in adequate volume but in insufficient pressure, a super-heater will be quite helpful, and may displace a boiler—provided volume will still be sufficient. Additional boilers would, of course, be useless. When a rig boiler plant of from two to four boilers is capable of supplying steam at adequate pressure but in insufficient volume, then an additional boiler is of more service to the rig. Steam separators or scrubbers should always be used in front of the prime movers and pumps.

Another means of obtaining the required fluid volume and pressure is by using boilers which deliver steam at 200 pounds to 250 pounds and by increasing the size of the steam end of the pump correspondingly, which approximates 2½ to 3 times the fluid-piston diameter. Obviously, this calls for a corresponding increase in steam volume—which, with all other facilities adequate, is in direct proportion to the increased steam-cylinder displacement, which means more boilers in the power plant. The efficiency and economy of this type pump is yet to be proved, although apparently the few at present in service are showing satisfactory results; i. e., they are delivering the desired volume of mud-laden fluid with reasonable economy.

A third method of attack is to operate a power pump with an efficient multi-cylinder steam engine having a variable cut-off, permitting the full use of the expansion of the steam. Running at maximum efficiency, this combination of units should show a steam-volume saving somewhat in excess of 40 percent over the direct-acting steam pump. Thus it is possible immediately to eliminate roughly one-third of the boiler-plant capacity. Power pumps of adequate power end capacity are now available for the most difficult problems as encountered in Kettleman Hills, Ventura, and similar areas. Where fuel economy is important and good water scarce, the value of the combination is unquestionable. For the operation of these power pumps, there is much prime-mover equipment available that will permit the use of low-pressure boiler plants of relatively small-volume capacity and still deliver all the fluid that might be required. Maximum efficiency demands the use of super-heated steam in a pumping plant of this type.

Engines and Drawworks

The engines now in use may be dismissed as being adequate, although some are not so efficient as they might be. Although the drawworks or hoists are entirely unsatisfactory in many respects, the recent developments tending toward improved and continuously-sprayed or oil-bath chains and sprockets seem to have materially increased their utility and economy. More time is necessary for complete tests of the value of the improvements.

At best even, these new hoists are makeshift, and extremely crude and inefficient; but there still remains the possibility of building an efficient and safe machine capable of handling the most difficult drilling jobs—which means, in other words, capable of handling long strings of drill pipe at the highest safe speeds. It is possible that the present-day fundamental methods and equipment are not the best that can be applied to the work.

Bits

Bits may be classified by types as "drag" or those designed actually to cut or sheat the formation; disc bits which work on a similar principle to the drag-type, but are otherwise quite different; and rolling-cutter rock bits.

Drag bits are of many patterns, shapes, and forms —which, in general, may be reduced to three types: viz., two-way or fishtail, three-way, and four-way bits. The last two may have leading pilots or may cut a high center hole. Each of these various types has its advocates, and is best suited for use in certain formations. In general, they have been developed through trial and error, rather than along logical lines of engineering or scientific research. Possibly the trial-and-error method of development has been, and is, more satisfactory—although it seems certain that systematic research would be helpful.

The simplest of the drag-type bits is the two-way or fishtail, and was the first boring tool used in the industry. They vary from the long-bladed heavy patterns, with the water courses one to several feet from the cutting edge of the bit or the bottom of the hole, to the bell-bodied fishtails or, as commonly called, "gumbo" bits. The dressed part of the blade, which contains the cutting or shearing edge at the bottom, varies from practically flat to deeply-concave on the forward side; and the outer point may be advanced from the true radius of the hole or be coincident with it. It may be said here that the old long-bodied fishtail or "paddle" has been, or should be, discarded except for special jobs—although the bell-bodied tool still has a wide field of usefulness in drilling those formations which tend to ball up on the bit and have to be removed from the hole as mud rather than as cuttings. These are the "gumbos" or plastic clays and sticky shales. For formations of this nature, the gumbo bit with very slightly concave blades is an excellent tool, and probably the best type that can be employed. The slight concave forward surface of the blade is desirable in order that the cutting edge may do somewhat more than scrape the bottom of the hole; but should it be too severely concave, the tool will dig in too rapidly and be difficult to keep clean. The water courses should be so directed across the blade that the mud stream will be as effective as possible in keeping the tool clean. The use of the fishtail or two-way bit in any but these soft sticky formations should be avoided, as it will not run smoothly in hard beds because of having one line of bearing surface on the bottom of

YOUNGSTOWN SPEEDTITE Casing

ON DISPLAY AT THE EXPOSITION

A major improvement in casing design.... accelerates make-up....achieves 85% joint efficiency....assures pressure-tight joints....provides maximum clearance. Don't fail to ask for complete demonstration at our booth in the Continental Building at the Oil Exposition.

SPEEDTITE YOUNGSTOWN CASING

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

Youngstown's Pipe is distributed by --

THE CONTINENTAL SUPPLY COMPANY, Dallas, Texas

CONTINENTAL EMSCO CO., INC., 30 Rockefeller Plaza, New York City

REPUBLIC SUPPLY CO. OF CALIFORNIA, Los Angeles

THE YOUNGSTOWN STEEL PRODUCTS CO., Dashwood House, Old Broad Street, London, E. C. 2, England

Tubular Products; Sheets; Plates; Tin Plate; Bars; Rods; Wire; Nails; Conduit; Unions; Tie Plates and Spikes.

612

use, are probably the most logical of the several the hole. This bit is best built with a tool-joint box rather than a pin at the top.

Three-way drag bits, although not in very general type insofar as the number of blades are concerned —it being a well known fact that a three-point boring tool of any kind will run more smoothly than will a two- or four-way tool. The three blades of this bit may be made as three full blades or as the "fingering" type. The three blades or outer fingers are all built to gage size and cut the same hole area, with the inner fingers so spaced that a cutting edge on one blade follows a blank of the next blade. These bits should be built with a tool-joint box up, and have one circulation outlet over each blade; and the blades should extend not more than a few inches below the body of the tool.

Four-way bits are usually built with the blades at 90 degrees—although some manufacturers prefer to build them in an "X" form. The bell-bodied type with the tool-joint box up is likewise the best form for this tool, and the four blades should be cut into fingers slightly concave on the forward surface and slightly leading at the outer points. Only one of the cross-members should be built to gage; the other should be about ⅛ inch less in width in order to avoid binding. There should likewise be holes so placed that a fluid stream is directed against each blade, and the cutting edges should not reach more than 4 inches or 5 inches below the body of the tool. Long pilot cutters on the bit should be avoided; they tend to drill a crooked hole.

It is general practice at the present time to use cast-steel bits; they are proving to be very satisfactory, and breakage is practically nil—although they are subject to fatigue, and should be normalized after each third or fourth run. The blades of the bit, of course, are dressed with tungsten-carbide inserts in such a manner that the edge will become serrated. The water courses of the tool should be very carefully directed to clean the cutting blades and not dig into the walls of the hole. Most bit manufacturers and welders are extremely careless in this respect; and seem to think that, as long as the fluid is allowed to get out of the bit and wash some of the cuttings upward, it is doing that which is required of it. But this is obviously not all that is necessary; a properly-designed and -dressed bit, improperly cleaned, is not an efficient cutting tool.

On a fishtail bit the bearing surface of the bit (the cutting edges in contact with the bottom of the hole) is 100 percent of the diameter of the hole. On a three-way or four-way tool, the bearing surface should not exceed the actual bore diameter plus 10 percent, which 10 percent should be placed on the gage side of the bit to cut the outer area of the hole. The design and building of these bits for a given field should be very carefully studied, as practically all formations have their peculiarities and offer definite problems.

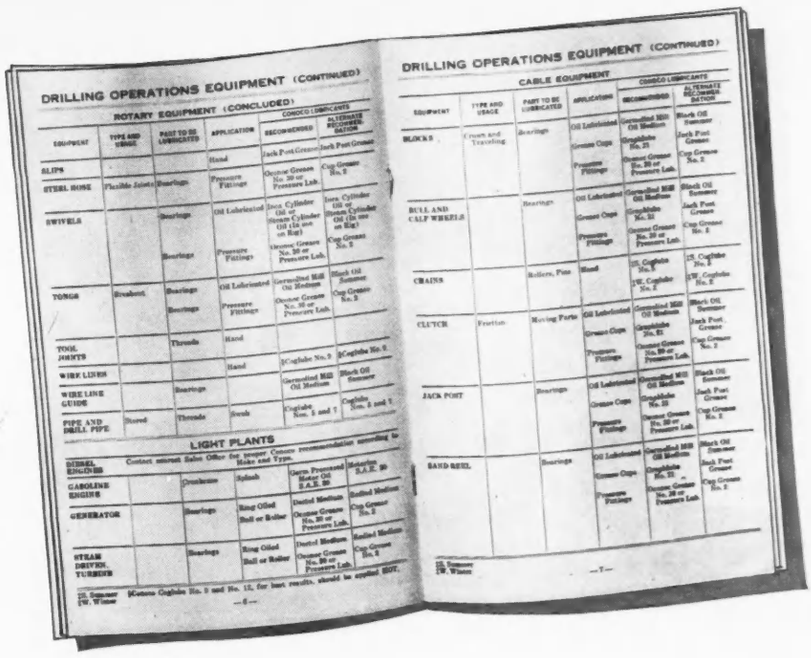
Disc bits, which work on the principle of the ordinary disc plow, are excellent hole makers in formations to which they are adapted, and provided they are thoroughly cleaned and properly run. They require for best efficiency an extremely delicate and uniform feed, with relatively little weight and a large volume of circulating fluid. Having replaceable cutting elements, which are dressed and finished by the manufacturer of the bits and not in local welding shops, a more uniform product is generally obtained. This tool is best suited for use in materials such as shales and sandy shales which are neither very hard nor sticky. The common criticism of them is that they are hard on drill pipe. This does not seem to be true in formations in which the bit may be logically used and when they are properly handled. As hole makers, under favorable circumstances, they are probably the best of the shearing-type bits—although in formations of varying character, where there are hard beds and sticky streaks, they may not be so useful as the ordinary drag-type.

Rock bits of the rolling-cutter type were first built to drill the limestone cap rock of some of the salt domes along the Gulf Coast. Since that time vast improvement has been made in the steels used and in the methods and manner of finishing the cutting teeth. Roller bearings, lubricated by the mud-laden circulating fluid, have taken the place of the old sleeve bearings and of the rather ineffective oil lubrication. Through the use of superior steels, the cutters have been lengthened; and, with a layer of the hard, highly-abrasive tungsten carbide on one side, they are in a manner self-sharpening and can, therefore, be kept in the hole for a much greater length of time than could the older, replaceable cutter-types without hard-facing alloys or roller bearings. Another practice that has enabled the tools to make faster hole is the increase in rotating speeds over the 30 or 40 revolutions per minute that was customary for the earlier types.

The design and form of the actual cutting elements and their teeth show only very slight improvement. The manufacturers of these tools have striven to their utmost to improve them, and have succeeded, except in the design of the cutters. Now it remains to pattern the form of these elements to increase their actual cutting ability insofar as the principle of cutting is concerned.

The cutting elements are of two general forms: one cylindrical, and the other cone-shaped. On these there are two general types of teeth: one positioned along the radius from the center of the cutting tool and the other around the cylindrical or cone-shaped part at angles approximating 90 degrees to the radius. The first of these types leaves radial striations on the bottom of the hole. All of these teeth, or practically all of them, are regular and symmetrical in form; i. e., the axis of the tooth is normal to the tangent of the circle at the base of the tooth. As the bit rotates, these teeth strike the bottom of the hole in a direction normal to its surface. This, in fact, gives a blow similar to that imparted to the stone when a mason holds his chisel vertically and strikes it on the head with a hammer or maul. This does not chip the stone from the solid, but rather drives the chisel—or tooth, in the case of a rock bit—into it and shatters or breaks out particles of the stone on either side of the cutting tool by a wedging action. The mason uses this type cutting tool for certain purposes only, primarily for decorative effect. When he works his material into shapes and forms and wishes to reduce its face as rapidly as possible, he holds his chisel at an acute angle to the face of the material which he is working. This same principle of stone working is as applicable to the rock-bit tooth as it is to the stone mason's chisel.

Teeth of symmetrical form, radially placed on the cutter, strike the stone a practically vertical blow,


DRILLING OPERATIONS EQUIPMENT (CONTINUED)

ROTARY EQUIPMENT (CONCLUDED)

EQUIPMENT	TYPE AND USAGE	PART TO BE LUBRICATED	APPLICATION	CONOCO LUBRICANTS RECOMMENDED	CONOCO LUBRICANTS ALTERNATE RECOMMENDATION
SLIPS			Hand	Jack Post Grease	Jack Post Grease
STEEL HOSE	Flexible Joints	Bearings	Pressure Fittings	Ozonoe Grease No. 30 or Pressure Lub.	Cup Grease No. 2
SWIVELS		Bearings	Oil Lubricated	Iaca Cylinder Oil or Steam Cylinder Oil (In use on Rig)	Iaca Cylinder Oil or Steam Cylinder Oil (In use on Rig)
		Bearings	Pressure Fittings	Ozonoe Grease No. 30 or Pressure Lub.	Cup Grease No. 2
TONGS	Breaker	Bearings	Oil Lubricated	Germalloid Mill Oil Medium	Black Oil Summer
		Bearings	Pressure Fittings	Ozonoe Grease No. 30 or Pressure Lub.	Cup Grease No. 2
TOOL JOINTS		Threads	Hand		
WIRE LINES			Hand	[illegible] No. 2	[illegible] No. 2
WIRE LINE GUIDE		Bearings		Germalloid Mill Oil Medium	Black Oil Summer
PIPE AND DRILL PIPE	Stored	Threads	Swab	[illegible] Nos. 1 and 7	[illegible] Nos. 1 and 7

LIGHT PLANTS

DIESEL ENGINES	Contact nearest Sales Office for proper Conoco recommendation according to Make and Type.				
GASOLINE ENGINE		Crankcase	Splash	Above Freezing Motor Oil S.A.E. 30	Motor Oil S.A.E. 30
GENERATOR		Bearings	Ring Oiled Ball or Roller	Dented Medium Ozonoe Grease No. 30 or Pressure Lub.	Rodted Medium Cup Grease No. 2
STEAM DRIVEN TURBINE		Bearings	Ring Oiled Ball or Roller	Dented Medium Ozonoe Grease No. 30 or Pressure Lub.	Rodted Medium Cup Grease No. 2

[illegible] Nos. 2 and No. 12, for best results, should be applied HOT.

—6—

DRILLING OPERATIONS EQUIPMENT (CONTINUED)

CABLE EQUIPMENT

EQUIPMENT	TYPE AND USAGE	PART TO BE LUBRICATED	APPLICATION	CONOCO LUBRICANTS RECOMMENDED	CONOCO LUBRICANTS ALTERNATE RECOMMENDATION
BLOCKS	Crown and Traveling	Bearings	Oil Lubricated	Germalloid Mill Oil Medium	Black Oil Summer
			Grease Cups	Graphidox No. 35	Jack Post Grease
			Pressure Fittings	Ozonoe Grease No. 30 or Pressure Lub.	Cup Grease No. 2
BULL AND CALF WHEELS		Bearings	Oil Lubricated	Germalloid Mill Oil Medium	Black Oil Summer
			Grease Cups	Graphidox No. 35	Jack Post Grease
			Pressure Fittings	Ozonoe Grease No. 30 or Pressure Lub.	Cup Grease No. 2
CHAINS		Rollers, Pins	Hand	1S, Cupfidox No. 1 1W, Cupfidox No. 2	1S, Cupfidox No. 1 1W, Cupfidox No. 2
CLUTCH	Friction	Moving Parts	Oil Lubricated	Germalloid Mill Oil Medium	Black Oil Summer
			Grease Cups	Graphidox No. 35	Jack Post Grease
			Pressure Fittings	Ozonoe Grease No. 30 or Pressure Lub.	Cup Grease No. 2
JACK POST		Bearings	Oil Lubricated	Germalloid Mill Oil Medium	Black Oil Summer
			Grease Cups	Graphidox No. 35	Jack Post Grease
			Pressure Fittings	Ozonoe Grease No. 30 or Pressure Lub.	Cup Grease No. 2
SAND REEL		Bearings	Oil Lubricated	Germalloid Mill Oil Medium	Black Oil Summer
			Grease Cups	Graphidox No. 35	Jack Post Grease
			Pressure Fittings	Ozonoe Grease No. 30 or Pressure Lub.	Cup Grease No. 2

1S, Summer
1W, Winter

—7—

Back of These Recommendations

is our experience in oil fields from Canada to Mexico and Louisiana to California

We operate in a lot of oil fields and do a lot of exploration work. Naturally, we have run up against just about every kind of production problem that exists. So we can speak with some authority when we say that CONOCO Oil Field Lubricants will reduce your production and maintenance costs. They have been tested in our own operations. Back of them is the combined experience of our manufacturing and production departments and hundreds of other producers. You can secure the lubricants you need from our sales warehouse nearest you. Write to Dept. 18, Ponca City, Okla., for new book on applying oil field lubricants to everything from crown block to bit.

CONOCO OIL FIELD LUBRICANTS

CONTINENTAL OIL COMPANY – Est. 1875

CONTINENTAL OIL FIELD LUBRICANTS IN STOCK AT THESE POINTS:

CALIFORNIA
Los Angeles

COLORADO
Craig
Denver
Ft. Collins
Ft. Morgan
Pueblo

KANSAS
Arkansas City
Chanute
Eldorado
Herington
Hutchinson
Independence

KENTUCKY
Owensboro

LOUISIANA
Lake Charles

MONTANA
Billings
Cut Bank
Great Falls
Lewistown
Shelby
Winnett

NEW MEXICO
Artesia
Farmington
Gallup
Hobbs

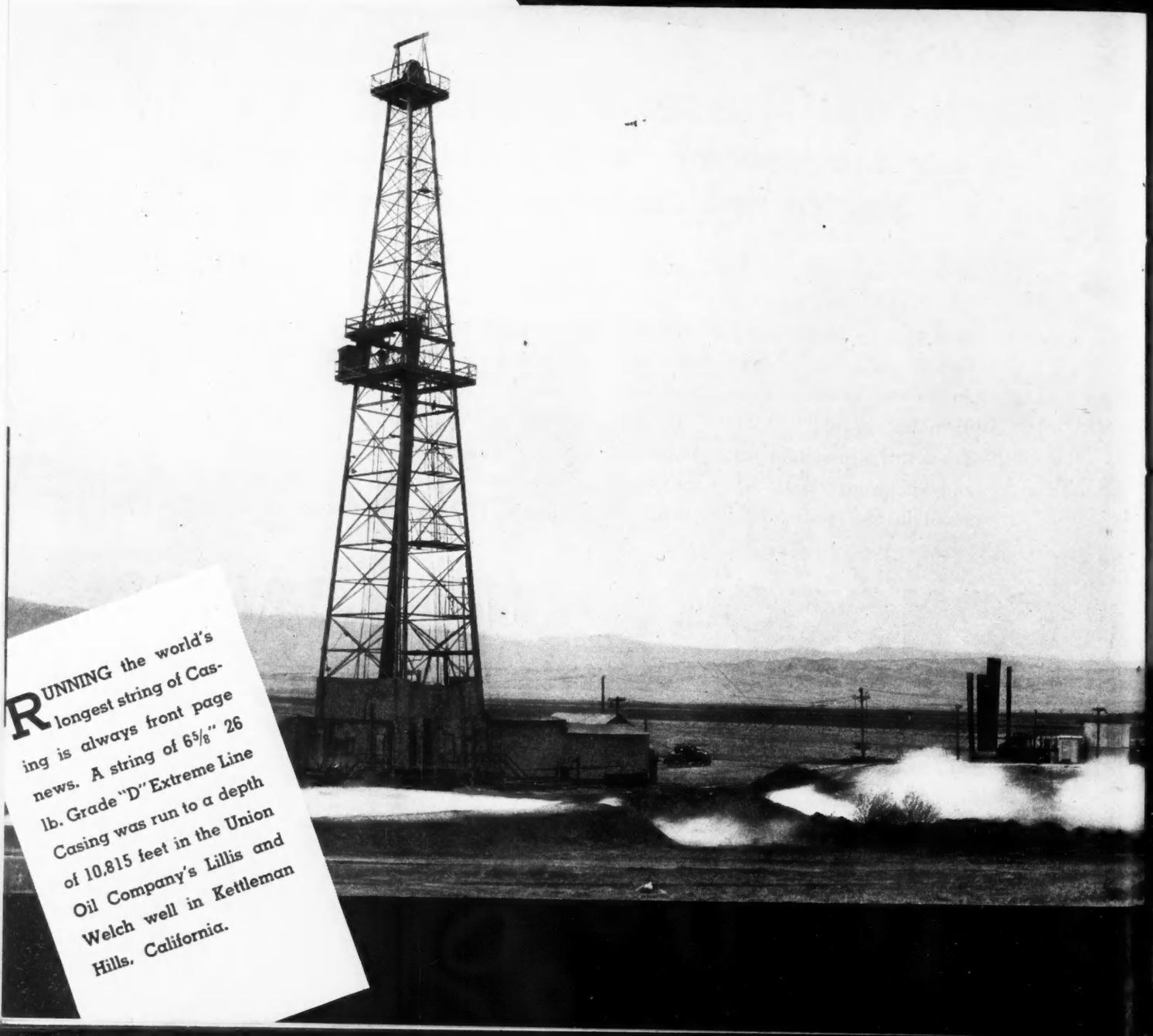
OKLAHOMA
Ada
Altus
Ardmore
Bartlesville
Chickasha
Duncan
Edmond
Enid
Guthrie
Muskogee
Oklahoma City
Okmulgee
Ponca City
Seminole
Tulsa

TEXAS
Amarillo
Beaumont
Big Spring
Borger
Breckenridge
Brownwood
Corpus Christi
Corsicana
Dallas
Fort Worth
Galveston
Houston
Longview
Marshall
McCamey
Mexia
Midland
Mineral Wells
Pampa
San Antonio
Tyler
Wichita Falls

WYOMING
Casper
Glenrock
Greybull
Lovell
Lusk
Medicine Bow
Rawlins
Thermopolis
Worland

The Longest String of Casing Ever Set..... Over 2 miles deep

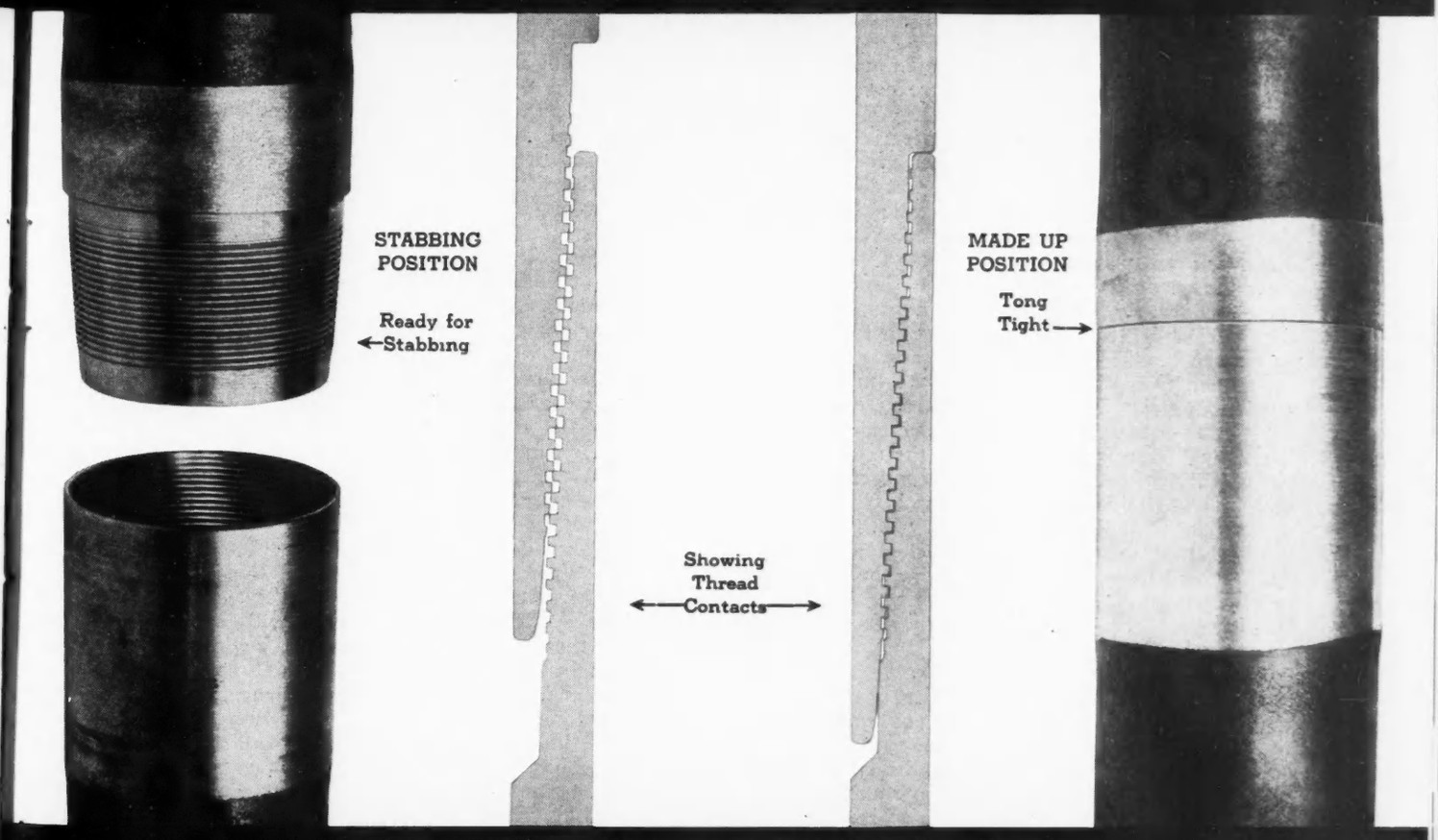
STAND



RUNNING the world's longest string of Casing is always front page news. A string of 6⅝" 26 lb. Grade "D" Extreme Line Casing was run to a depth of 10,815 feet in the Union Oil Company's Lillis and Welch well in Kettleman Hills, California.

ARD SEAMLESS

EXTREME LINE CASING



Outstanding characteristics of this product are:

1.—Ease of stabbing, practically self-aligning.
2.—Complete lack of galling.
3.—High joint strength.
4.—Minimum diameter at the joint.
5.—Maximum speed in running.
6.—High resistance to leakage.
7.—Stream-lined outside contour.
8.—High resistance to damage.

These and other basic advantages of Extreme Line Casing are described in our Bulletin No. 2 just issued. These Bulletins are available at any of our branch offices.

SPANG, CHALFANT & CO., INC.

GENERAL OFFICES: CLARK BUILDING, PITTSBURGH, PA.

Sales Offices: New York, Boston, Pittsburgh, St. Louis, Tulsa, Los Angeles, Houston, San Francisco, Seattle, Chicago

Welded Mills: Etna, Penna., Sharpsburg, Penna. Seamless Mills: Ambridge, Penna.

displacing particles ahead of the tooth and behind it. Those chips displaced to the front are probably struck and re-cut by the next descending tooth before they can be removed from the hole by the mud-laden fluid—thus resulting in further comminution of the particles. The other type tooth that is placed at right angles to the axis of the cutters likewise strikes a vertical blow; and, with the hard facing on the outside, has a tendency to displace the particles of stone toward the center of the hole. The mud-laden fluid then comes in contact with the top of the chip and passes it outward toward the periphery of the bore. While in transit, it will again be cut by descending teeth.

It would seem more logical that the teeth be so designed that, as they remove the material being cut from the solid, they throw it toward the outside of the hole—thus preventing unnecessary re-cutting, and affording the mud-laden fluid the opportunity of passing under the chips and of more rapidly removing them from the working face. The water courses should be so directed that the fluid may play on the bottom of the hole and also rotate the cutting elements in their forward direction, thus preventing locking and sliding on bottom. For pumps throwing a fluid volume of 750 gallons to 800 gallons per minute, the total cross-sectional area of the fluid outlets should be approximately two to three square inches divided between four or five holes.

Changing bits: We have not yet learned when bits, either of the drag or rolling-cutter type, should be pulled—it is usually left to the guess of the driller that the bit is dull. In a shallow hole this does not matter greatly unless the bit is run too long, which means slower penetration and danger of deviation from the vertical. In deep holes, in addition, there is the considerable lost time in unnecessary round-trips occasioned by pulling the cutting tool too soon. In proven fields more should be known as to which bit to run in a given section of the hole, and how much footage it should drill (or the rate per foot to which the cutting speed should decrease) before it is changed for a fresh bit. This is the essence of efficient drilling insofar as bits are concerned, and requires systematic study and research.

Weight on the Bit

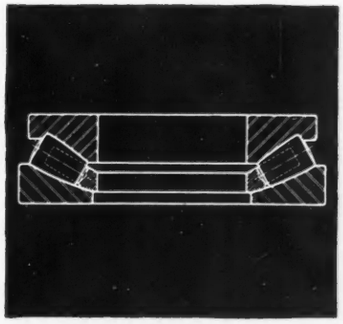
The bit or cutting tool is attached to the lower end of the drilling shaft which, from the bit upward, is composed of thick-walled heavy tubes called "drill collars" or "bit collars"; thinner-walled pipe put together with tool joints and couplings, called "drill pipe"; and a hollow shaft of angular cross-section at the top. This composite shaft is by all means the most delicate piece of equipment used in the drilling of a well, and regulates to a very considerable extent the weight that may be carried on the bit. It is essential that the drill pipe above the drill collars be held in tension; otherwise its rotation in unbalanced compression and the universal joint action where it is in the least crooked will cause undue fatigue and eventually fatigue failure. Further, in order that a straight hole be drilled, it is likewise necessary that the drill pipe be held in tension or straight in the hole.

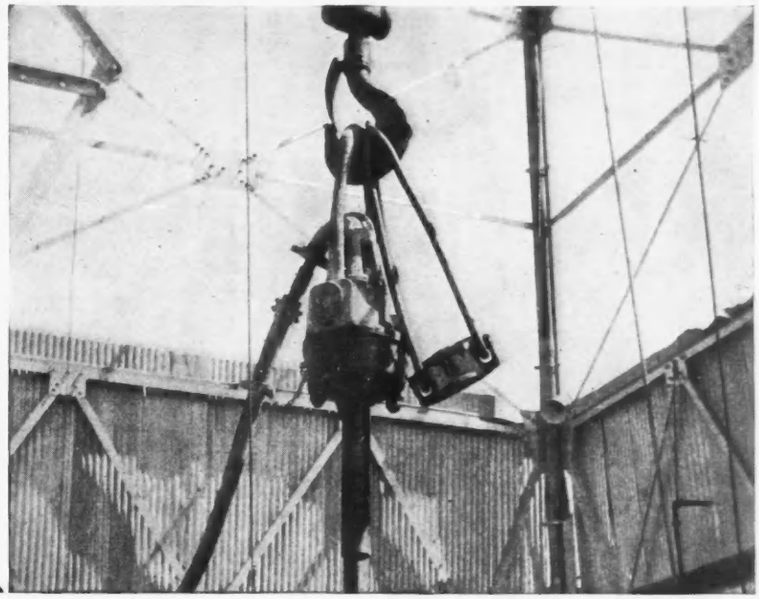
In determining the proper amount of weight to be supported by the bit, four major factors must be considered:

1. The weight that may be carried within the work capacity of the drilling shaft—which is governed by the size of the shaft, the type of bit, the nature of the formation being cut, and the weight of the drill or bit collars at the lower extremity of the string. By work capacity is meant that limit of work which, if exceeded, will cause immediate failures in the equipment or undue strains and consequent fatigue resulting in premature failures. We are not certain that the correct sizes of drill pipe are being used, particularly in large holes; but it may be safely said that they are not far from those dimensions and weights which most fully meet the requirements of ordinary drilling conditions. Positively the steel of the tubes and the pipe-thread forms could be improved, especially the latter. The V-thread, even though slightly rounded, is unquestionably unsatisfactory.

2. The weight that may be carried while maintaining the hole within that degree of deviation from the vertical required of the operation. This is controlled by the type bit being used, the nature and attatude of the formations, the speed of rotation, and the weight of the bit collars. The more nearly horizontal or convex the face is cut by the bit, the more weight that may be applied to the tool and still maintain a straight hole; while, obviously, horizontal formations of any character are less likely to cause deviations from the vertical than are the same formations where they offer inclined surfaces to the cutting tool. The steeper the dip, the greater the tendency for the bit to leave the vertical; also the harder the formations, the greater is this effect of inclination. Alternating hard and soft strata offer the greatest difficulties in straight-hole drilling, regardless of the structural attitude. Probably of most importance and the primary limiting factor in vertical drilling is the weight concentration immediately above the bit. This weight must be sufficient to supply that required by the bit on bottom and also to hold in tension (or straight) the drilling shaft below the rotary table. Then, to show the extreme example, if the bit is attached to the drill pipe without the use of bit collars, absolutely no weight may be allowed to rest on the bit if a vertical hole is to be drilled. The pumps, through the circulating fluid, must do all of the work. From this minimum, then, the bit-collar weight should be governed by the weight required for the bit and a sufficient surplus to keep the drilling shaft in tension and hanging vertically below the rotary table. Obviously, there is a practical limit to the length of drill collars; for, if they are too long, they then assume the position of a drilling shaft without drill collars. Probably 200 feet is as much as can be run advantageously. The ideal collar would be one having its maximum diameter and the weight at the bit, and then decreasing in these proportions to the size of the drill pipe. Experience seems to indicate that in ordinary flat-lying formations not more than 75 percent of the drill-collar weight may be supported by the bit, while 50 percent is better practice. As the inclination of the beds increases, the drill-collar-weight percentage must be almost correspondingly decreased—until, with strata approaching the vertical, practically no weight may be carried. In hole-straightening work the bit must be especially designed for the job, and

SKF-EQUIPPED
BUILT BY
EMSCO DERRICK
& EQUIPMENT CO.





FOR NINE YEARS

SKF *and Emsco have worked together in the oil fields*

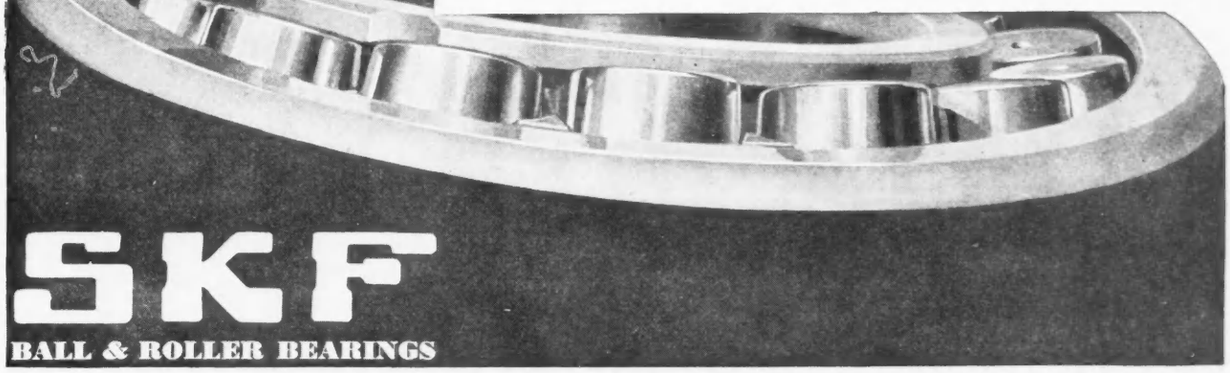
It is characteristic of the Emsco Derrick & Equipment Company, who for nine years have used SKF Bearings, that they specified an SKF Spherical Roller Thrust Bearing on this new Type "D" Oil-Cooled Swivel with its air-cooled washpipe.

They knew from the good performance of the SKF Bearing on other Emsco products that it is the logical bearing for this equipment. So they put an SKF at the principal thrust location of the swivel, where it took continuous thrust loads for 770 hours with no trouble at all.

The SKF Spherical Roller Bearing insures equalized load distribution with full capacity and long life. Be sure to see the SKF exhibit at the International Petroleum Exposition.

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

3611

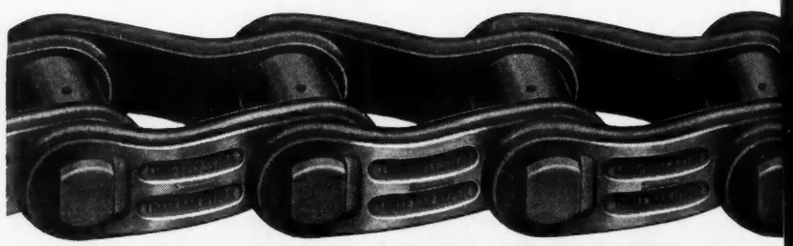


SKF
BALL & ROLLER BEARINGS

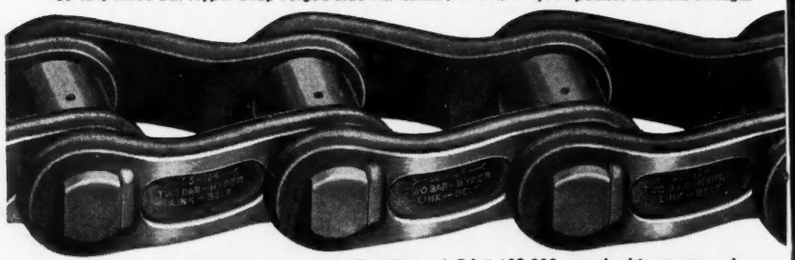
PICK YOUR CHAIN *from t*

● Chains made only as the leading chain manufacturer can make them.

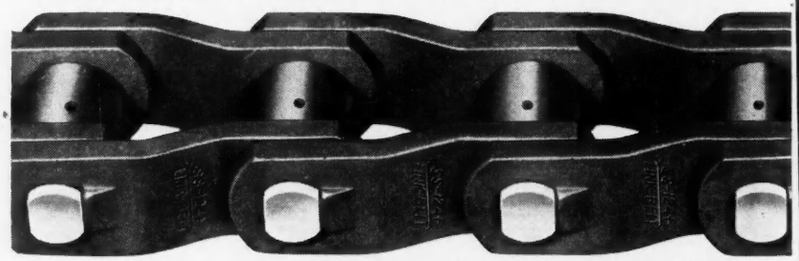
Every value that results in strength, smooth operation, long service life and thorough reliability, is built into these Link-Belt "SS" class rotary drilling chains.



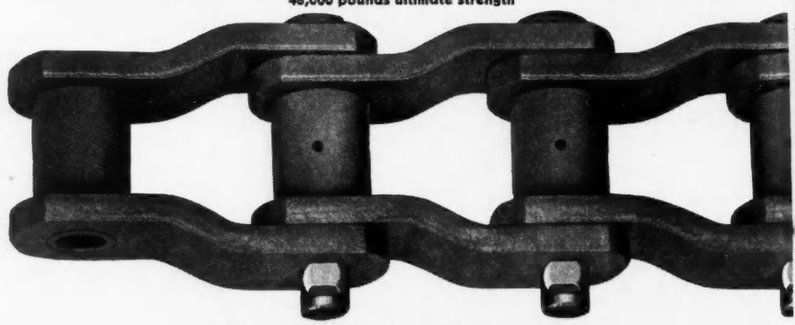
SS-124, Three-Bar Hyper Drop Forged Side Bar Chain (A.P.I.4) 170,000 pounds ultimate strength



SS-124, Two-Bar Hyper Drop Forged Side Bar Chain (A.P.I.4) 130,000 pounds ultimate strength



SS-124+, Red-Hed (A.P.I.4) 112,000 pounds ultimate strength and SS-40+, Red-Hed (A.P.I.3) 48,000 pounds ultimate strength



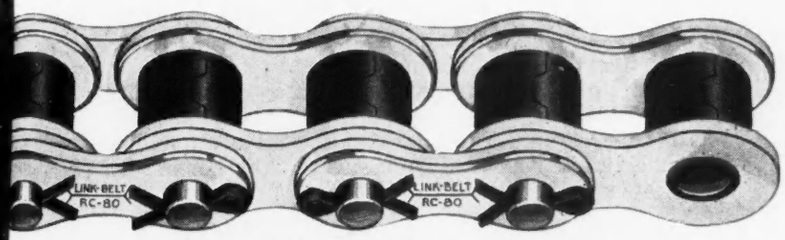
SS-40 Hyper (A.P.I.3) 75,000 pounds ultimate strength

Built by

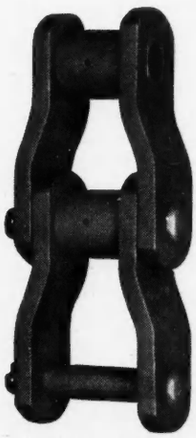
m this Complete Line

● For greatest efficiency in power transmission on all kinds of light and heavy oil field equipment use Link-Belt Silverlink roller chain, "RC" flexible couplings, and anti-friction bearing units.

Send for catalogs. Address Link-Belt Company, Indianapolis, New York, Los Angeles, Houston (Fred Wallace, 4317 Montrose Blvd.), or Oklahoma City (W. H. Abele, Box 305, Route 4.

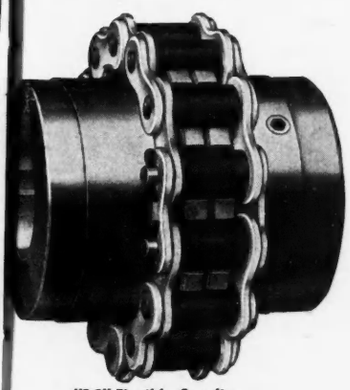


Silverlink Roller Chain. For transmitting power at high speed

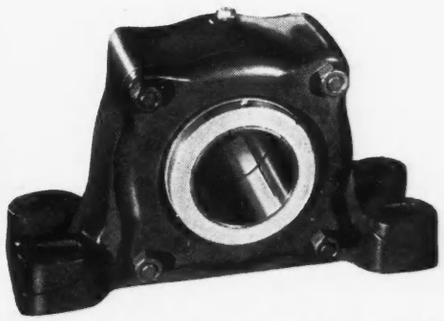


SS-124 (A.P.I.4) 60,000 pounds ultimate strength

SS-40 (A.P.I.3) 28,000 pounds ultimate strength



"RC" Flexible Coupling



Link-Belt Self-Aligning Anti-Friction Roller Bearing Pillow Block

YES, AND EVERY TYPE OF CHAIN AND TRANSMISSION UNIT FOR ALL OTHER OIL FIELD SERVICES

See Our Exhibit — Tulsa Oil Show — Texas Bldg.

LINK-BELT

bit must be especially designed for the job, and the weight carried must not exceed that which will allow a substantial pressure against the reaming edge or points of the bit from the horizontal component of the inclined drilling shaft.

3. A limiting factor of the weight that may be carried is the bit being run; however, this weight limit will so generally fall well within other limitations of the operation that it is really of secondary importance.

4. The weight at which the hole may be most rapidly drilled.

The proper balance of these four considerations results in maximum drilling efficiency, it being assumed that the mud-laden fluid is of that character and volume that is best suited to the formations being drilled and the tools drilling them. This proper balance may not be stated in definite figures because of the many unknowns, the lack of uniformity in the materials being cut, and the wear on the cutting tool; but reasonable limits may be given. Under no circumstances should the weight carried on the bit exceed the weight of the drill collar, regardless of the tools in the string, and 75 percent or less seems to be better practice. Probably 10 tons of weight is as much as is ever required under any ordinary conditions, and half that weight seems to be generally satisfactory. Naturally, the size of the bit must be taken into consideration.

In some areas where, with the use of guides or reamers, the hole can be kept relatively straight, it is customary to carry substantially more weight on the bit than is logically permissible considering the weight of the drill collars in the string. In consequence, there are many fatigue failures such as break-offs or thread breaks; and as long as these excessive weights are carried, regardless of the absence or presence of a guide, these pipe failures are certain to occur.

A shaft, either solid or hollow, when in unbalanced compression, is subject to fatigue upon rotation. In the ordinary drilling shaft, the most of these failures occur in the unengaged threads on the ends of the tubes to which the tool joints are attached. In the machining operation in which these threads are formed, the cutting tool induces a plane or zone of weakness along which the metal is more readily fatigued than in any other part of the pipe and, in consequence, thread failures are more frequent. It is possible that these V-thread failures could be eliminated by the use of a more rounded type.

By drilling a straight hole, generally speaking, the drilling shaft is, in consequence, subjected to minimum labor for the work accomplished.

In addition to the proper definite weight that should be carried on the bit, it is equally important that this weight be uniformly maintained. Otherwise there will be periods when the weight is excessive, thus inducing drill-pipe fatigue and having a tendency to drill a crooked hole; and, as the bit drills ahead, the weight carried becomes less than is proper. During these last-mentioned periods hole is being made at a slower rate than normal. It is also true that if the selected weight is that at which the tool cuts most efficiently, then during periods of excessive weight the cutting rate may be low while other undesirable conditions obtain.

Experience seems to indicate that at least 40 feet of drill collar should be used under any circumstances at any time, and that the proper length for most general service seems to be 120 feet. These lengths are not arbitrary; but it so happens that, because of the heavy cross-section, they are sufficient to permit the proper weights to be carried on the cutting tool with a reserve for maintaining the drilling shaft in tension.

Drilling Feed

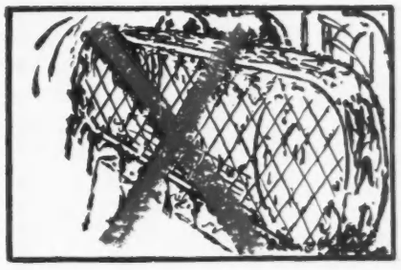
With the bit rotating on bottom, it is now necessary to lower it as it cuts headway into the formation. Regardless of how it may be accomplished, the ideal feed is one that maintains a constant weight on the bit and imparts to it a perfectly uniform rate of descent into a given formation. This rate of descent is the resultant of various factors of the operation against the material being cut. A uniform feed, whether automatically or manually controlled, assures that the bit is resting on bottom with the desired weight 100 percent of the time—no intermittent feed can possibly approach this efficiency. Shocks to the cutting edges of the bit are avoided by maintaining a steady pressure on the bottom of the hole, rather than by feeding off an excessive weight and then drilling off to insufficient weight—which is a natural result of any but a perfectly smooth and regular feed.

In uniform formations, where some feeding device that will do this job is used, the maximum weight that can be carried to maintain the desired straightness of hole is set, the other functions of the rig adjusted as required, and the equipment drills at maximum efficiency. In beds of alternating hardness, where the cutting tool passes from soft formation into contact with a hard formation, since the speed of descent is relatively slow, it may be described before excessive weight has been taken on by the bit. This protects the cutting edges of the tool, and lessens the inducement of fatigue in the drill pipe which would occur when the intermittent-type feed slips off too much weight onto the bit as the hard bed is encountered. With the feed having been caught before the bit takes excess weight, bends in the drill pipe—with the consequent tendency for the bit to go off from perpendicularity—are avoided.

Drill Collars

At the lower extremity of the drill pipe are placed "drill collars" or "bit collars." This part of the shaft has three primary functions: (1) to supply weight for the bit; (2) to hold the drill pipe in tension; and (3) to stiffen the shaft at the lower end of which the cutting tool is placed. This means then, largely, that the length of drill collar to be run depends upon the weight to be carried by the bit. However, in such areas as the East Texas field, where some 20,000 wells have been drilled, 6 feet or 8 feet of drill collar is adequate—provided the fluid volume is sufficient—since the pumps do all the work and cut the formation away so rapidly that the bit never takes weight or, as the driller expresses it: "the bit cannot keep up with the hole." Assuming the use of drill collars weighing 100 pounds to the foot and the desire to carry 5 tons of weight on the bit, it is then necessary to use somewhat in excess of 100 feet of collar—just what this excess should be, I am not sure; but I will say that at least 50 percent more than the weight to be supported by the bit, or maybe 100 percent more, is necessary. This should assure that both the drill

DAYTON COG-BELT DRIVES ARE CLEAN



NO OIL OR GREASE TO LEAK OR COLLECT DUST

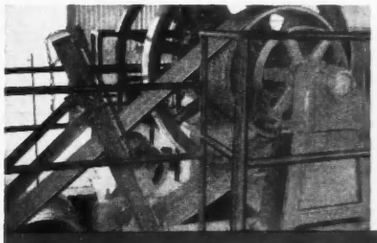
Dayton Cog-Belts don't need dressing to make them grip. They don't need lubrication. Dayton's exclusive construction combines utmost flexibility with maximum pulling power.

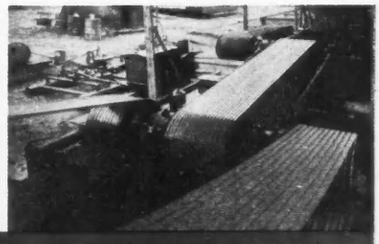
And that isn't all. Dayton Cog-Belts last longer. They save space. They are easy on bearings. They are quiet. They maintain positive speed. Because of their patented, laminated cog construction, they are "built-to-bend." There's no wrapper to stiffen the belt or buckle when the belt is bent. And because of the die-cut sides, Dayton Cog-Belts exert powerful traction upon the pulley. More than that, Dayton's crosswise rigidity causes positive wedging action in the groove.

These are only a few of the advantages of Dayton Cog-Belts. The whole story is told graphically in our big new book, "The ABC's of V-Belts". Write for your copy today.

★ ★ ★

THE DAYTON RUBBER MFG. CO.
DAYTON, OHIO
World's Largest Manufacturers of V-Belts
Manufacturers also of Dayton Fan Belts, Dayton Red Tube Radiator Hose, Dayton Thorobred Tires and Dayco Printers' Rollers





COMPACT • DURABLE • EFFICIENT
Dayton
COG-BELT DRIVES

COG-BELT DRIVES—F. H. P. V-BELT DRIVES—V-FLAT DRIVES—DAYCOIL OIL-PROOF V-BELTS—COMPLETE DRIVES, PULLEYS and BELTS IN STOCK

THE A B C's OF V-BELTS

This is the greatest book on V-Belts ever published. It shows how Dayton Cog-Belts transmit more power, save space, last longer, and reduce costs. This important book will help you solve your drive problems. It's free. Write for a copy.

pipe and at least the greater part of the drill collar are in tension and hanging straight in the hole. The ideal string would have all the weight to be carried on the bit concentrated in the bit itself, and then additional drill collar for stiffness and momentum. We should approach this as nearly as possible.

It seems probable that too litttle thought has been given in the past to the eccentricity of the drilling shaft—with the result that the boxes, pins, and the bores of drill collars are not made with sufficient precision. A drill-collar bore that is not symmetrical will cause a wobble in this part of the shaft, and may eventually result in fatigue failure. Further, an eccentric drill collar will cause the center of gravity of the bit to rotate in a circle rather than as a point; consequently, the hole is enlarged, the dangers of crooked hole are increased, the gage is worn from the bit, and the general drilling efficiency substantially reduced. The great importance of perfectly-balanced drilling shafts cannot be too strongly emphasized.

Reamers and Stabilizers

It is customary in some areas to run one or more stabilizers in the form of reamers. Where two are used, there is generally one immediately above the bit and the other 60 feet or 80 feet above. The practice has many advantages where the type of formation does not render it hazardous, and where round-trips are made with sufficient frequency that the danger of wearing out the cutter pins is inconsiderable. Another type of stabilizer that has been used, and which has many advantages, is a fluted guide having three or more bearing surfaces on the wall of the hole. These surfaces are faced with some hard alloy to prevent undue wear. It appears that this is the better type where the formations have a tendency to stick the pipe, or where round-trips are infrequent. The danger of losing a part of it in the hole is nil.

Although these reamers and guides have very decided advantages in certain formations, it is probable that in many cases their values are overbalanced by the dangers accompanying the running of the tool. They are serviceable; but, with the flexibility of the drill collar, they are probably not so valuable as guides in the drilling of straight holes as might be supposed. Reamers are extremely useful in bringing a hole to proper size after a bit that is out of gage has been pulled, for smoothing the irregularities in the walls of the hole, and for cleaning the walls of excessive mud plaster before casing is run.

Rotating Speeds

As originally designed and operated, rotating mechanisms on rotary rigs permitted speeds varying from 30 to 60 revolutions per minute, and such speeds were maintained until the introduction of diamond-drilling equipment into the oil fields. These machines were designed to operate at high speeds and with very delicate weights on the bit, as a matter of protection to the diamonds set in it. The success of relatively high speed diamond-drilling machines in making hole in competition with the conventional rotary soon caused the operators of this conventional-type equipment to adopt higher rotating speeds and generally to improve the drilling methods. This statement may be doubted by many rotary operators; but, nevertheless, it seems to be true. There have for years past been a sufficient number of diamond-drilling machines of the old and later types scattered throughout the oil fields—where they have come under the observation of oil-field operators—to have permitted a relatively wide and rapid dissemination of the principles of their operations. The early rotary machines had then, and still have, a substantial disadvantage of chain-and-sprocket-driven tables; however, new equipment has been perfected that eliminates this very objectionable and practical speed-limiting feature, and permits safe rotating speeds as high as 250 revolutions per minute or higher.

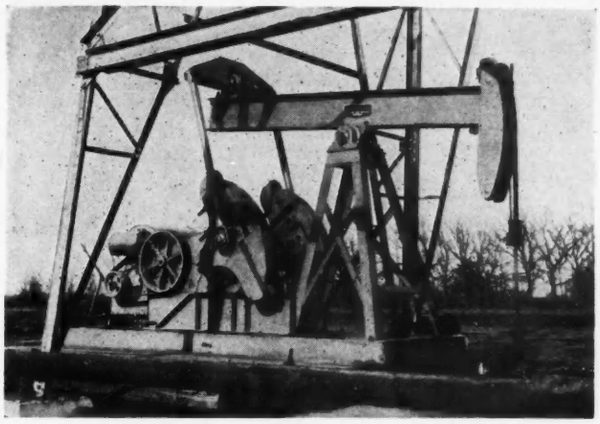
The first question in the mind of the average operator is whether the drilling shaft will stand such speeds. It seems that if the drilling shaft is balanced and true and the hole is straight, the faster the rotating speed within practical limits, the greater the momentum of the pipe in rotation and the less severe the shocks imparted to it by the cutting tool on bottom in encountering inequalities in the formation. Rotating speeds must be adapted to the type and size of the bit in use, and to the nature of the formations which they are cutting. Generally speaking, probably 100 revolutions per minute is as slow as any bit should be rotated, except under some very unusual conditions. The larger drag bits, from 17 inches up, if they are used at all, should be turned at rates approximating but not exceeding 100 revolutions per minute because of the greater likelihood of becoming stalled in the hole and the consequent danger of stall-shock-fatigue or actual failure in the drill pipe and breakage of the bit. The smaller-size bits of this type may, and in many cases should be, rotated as fast as 250 revolutions per minute. The proper speeds for rock bits depend largely upon the nature of the formation being drilled, and should vary from probably 100 (or in some cases less) up to 250 revolutions per minute. This latter speed is used in actual practice in one of the most difficult drilling areas with better results than for any slower speed; in fact, the rate of penetration of the bit varies almost directly as the speed of rotation.

On a rig using these rotating speeds, it is assumed that adequate drill collar will be in the drilling shaft in order to hold it in tension and to assist in the drilling of a straight hole. This heavy drill collar lends sufficient momentum to the pipe or cutting tool in rotation that any ordinary inequalities in the hardness of the rock are smoothed out.

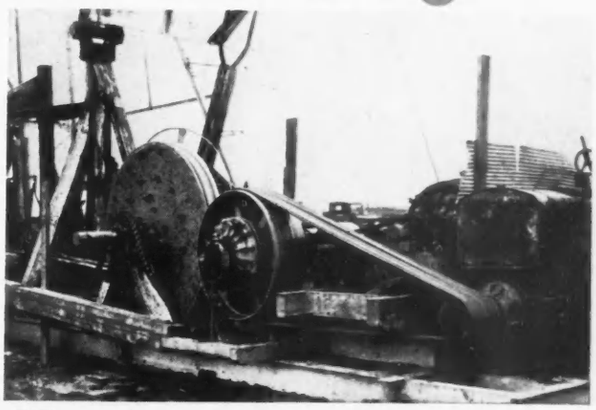
Means of Rotating

With the bit on bottom, and having selected a table speed, it is now necessary that it be rotated. The first machines of the rotating, fluid-circulating type designed for the purpose of boring holes into the earth were diamond drills. The prime movers of these units were small reciprocating steam engines, geared to turn the drill pipe or rods at relatively high speeds. The delicacy of this rotating power and the absence of heavy rotating parts in the engine resulted in the development of minimum drill-pipe fatigue, with a consequent minimum of failures or break-offs, and a minimum of shocks to the bit. When the first rotary-drilling rig was assembled, the only steam engines available were of the single-cylinder type with relatively heavy fly wheels. This prime mover had to serve in the operation of the hoisting equipment and in the operation of the rotary table. From this crude beginning have been developed the present-day splen-

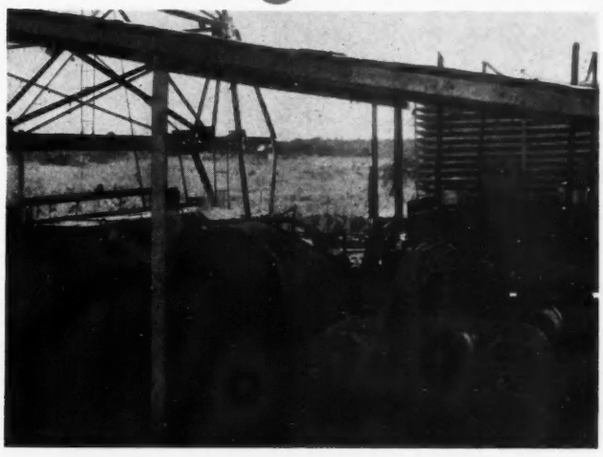
See These *OCS* Products

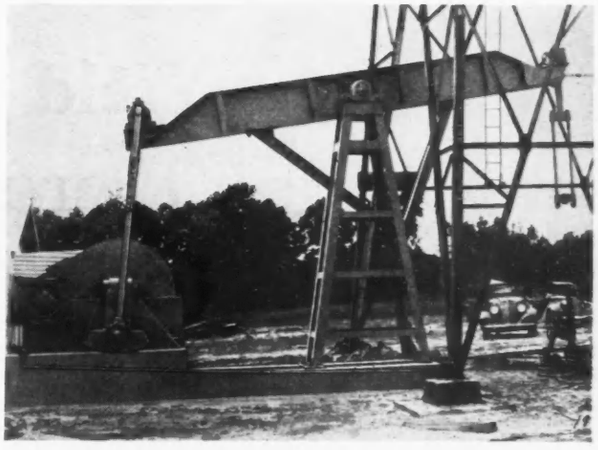


in 1936 Composite Catalog



Pages 1000-1017 Inclusive





OCS

Manufactured by

THE OIL COUNTRY SPECIALTIES MFG. CO.

COFFEYVILLE, KANSAS, U.S.A. LONG BEACH, CALIFORNIA, U.S.A.

McPherson, Wichita, Kansas—Pampa, Fort Worth, Kilgore, Texas
Oklahoma City, Tulsa, Seminole, Oklahoma
Hillman-Kelley, Inc., Los Angeles, California

The Wave of Acceptance

Come to

BOOTHS 87 & 88

OKLAHOMA BUILDING, INTERNATIONAL PETROLEUM EXPOSITION, TULSA

High-Yield Casing is on exhibition there for the first time

Get the Facts for Yourself About

—Its greater collapse value
—Its higher "pull-out" strength

A. O. SMITH CORPORATION

MILWAUKEE, WIS. — *BRANCH OFFICES:* NEW YORK, TULSA, HOUSTON, LOS ANGELES

Rolls On!

Manufactured under
U. S. Patent No. 1,993,842

HIGH-YIELD CASING

MORE FOR YOUR MONEY — HIGH YIELD CASING — LOWER-COST WELLS . . .

© A. O. Smith Corp., 193

did engines, rotary tables, and powerful drawworks. These heavy engines built of a size necessary for the desired hoisting speeds are geared down to operate the rotary table at the required rates. The bit is rotated on bottom, encountering formations of various hardness and attitudes; while the momentum of the moving parts of the large engines, shafts, sprockets, and chains subjects the bit and drill pipe to heavy shocks as the bit encounters harder formations—thus inducing fatigue, destruction of the cutting edges of the tool, and probably many bit breakages. It would seem that a more delicate rotating power would relieve the drill pipe of appreciable work—thus materially increasing its useful life, and greatly decreasing fatigue failures and consequent fishing jobs, and also decreasing bit wear and breakage. This type of rotating power can only be touched upon here. Suffice it to say that machines using relatively small and delicate rotating engines seem to give much greater useful life to drill pipe and bits and, it is believed, likewise drill straighter holes with the same weight.

The subjects of drill-pipe fatigue and failure have been considered at length, because the drill shaft is without question the limiting tool in the drilling of a well—and, consequently, every other factor in the operation should be brought to its maximum efficiency value in order to permit the drill pipe to reach its fullest possible accomplishment without undue labor.

The subject of drill-pipe length is important. The expense involved in measuring drill pipe in and out of the hole and the cost of errors made in mismeasurements are rather astonishing when they are thoroughly analyzed. Joints of drill-pipe lengths that are uniform to within ½ inch or less will entirely eliminate these errors and additional well costs, and it would not greatly burden the pipe manufacturers to furnish them. It would require, however, slight changes in the dimensions now in use. For example, 7 inches could be used instead of 6⅝ inches. Enormous quantities of 7-inch grade "D" casing are manufactured; it would not be very difficult to grade this pipe for lengths of a satisfactory maximum variation for each string were this size to be used for drill pipe. A selection could again be made after upsetting, with the result that tubes of uniform lengths could be easily furnished and at very little, if any, additional cost. The same principle holds for smaller-size drill pipe.

Mud-laden Fluid

Mud-laden fluids as used in the drilling of wells must serve numerous purposes, some of which are diametrically opposed to others—thus necessitating many compromises and the consequent use of fluids that are not entirely suited to all conditions that must be overcome or controlled. The more important functions of good drilling mud are: the removal of the displaced formation or cuttings from the path of the bit and up the hole to the surface; the cleaning and cooling of the cutting tool; the actual jetting of formation from the bottom, thus acting as a hole-making agent; protection of the walls of the hole from caving; prevention of flow of fluids or gases from the formations into the hole; and to supply sufficient pressure to control any of these fluids or gases which may be present under high rock or hydrostatic pressures. When upward movement of the fluid in the hole ceases for any reason, it must hold the cuttings in suspension without permitting settling back, and yet drop its burden into the ditch or pits when shaker screens are not used. The drilling fluid must "mud-off" or seal porous formations against gain or loss of fluid, and yet must not permanently mud-off oil or gas sands. Further, the fluid must have a minimum corrosive and abrasive action on the parts through which it passes, and must actually act as a lubricant for the roller bearings used in some types of bits. Some of these points will now be considered further; but first, and in order that these mud-laden fluids and their properties may be more readily discussed and fully described, I should like to propose a new term, viz:

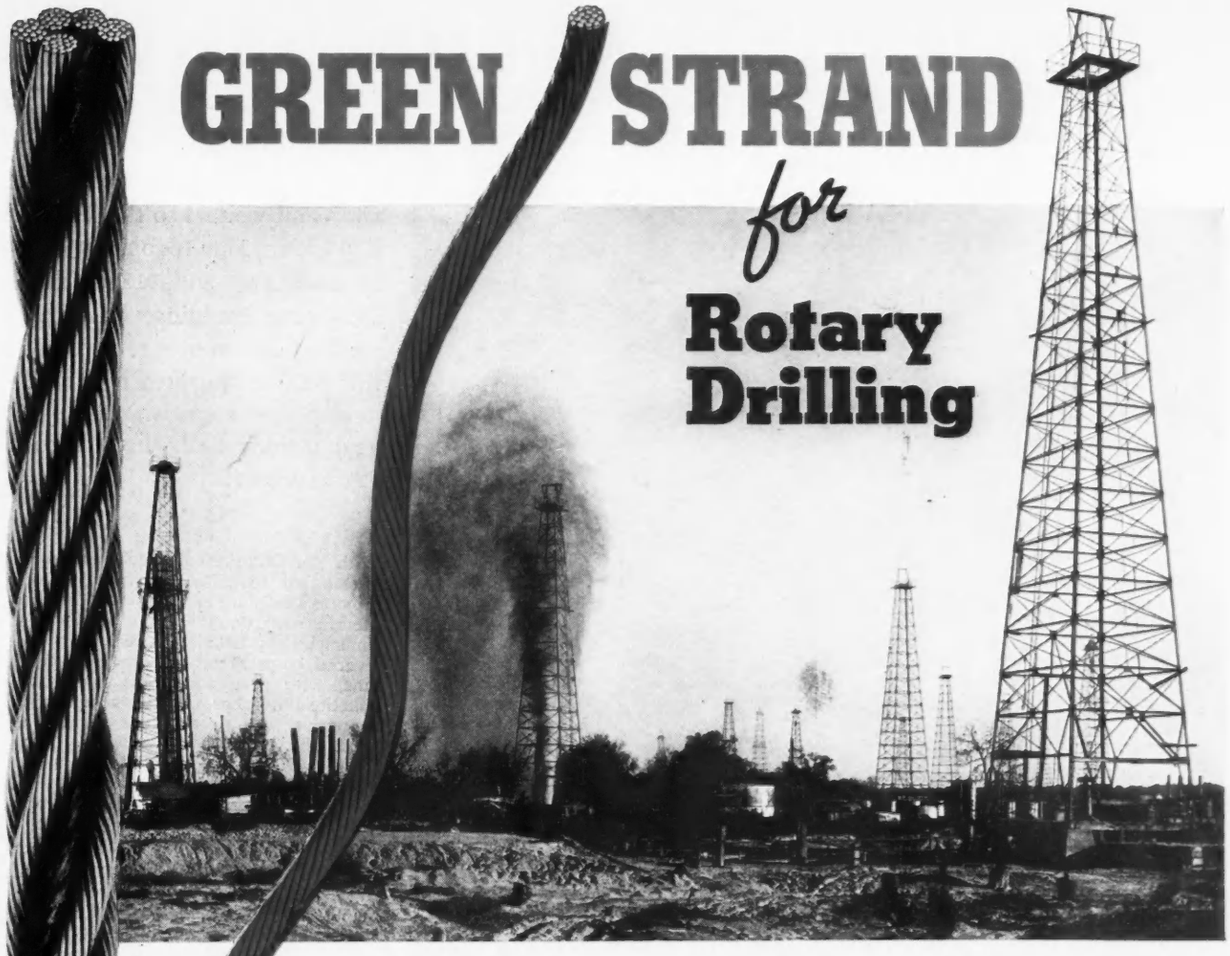
"Saturated fluid suspension": The point of saturated fluid suspension is at that proportion between a given-mud-forming solid and water of which there is no free water content and at which additional dry clay can only be held in suspension through mechanical agitation; or it is reached at that mixture of mud-forming solids and water at which it loses its fluidity and attains plasticity, provided more solids in the form used are added; or, it is the point beyond which mud-laden fluid ceases to be pumpable.

All raw mud-forming materials have a definite point of saturated fluid suspension; which is to say, mud-laden fluids of very definite weights only can be made of them. This point is controlled by the colloidal properties and the specific gravity of the materials. Because of this, it follows that the higher the colloidal properties of a given mud-making material, the lower the weight at the point of saturated fluid suspension; while, conversely, the lower the colloidal value of the material, the higher the specific gravity of the mud-laden fluid up to the maximum that can be formed by the pulverized mineral or clay being used. The extreme on the low side is some such material as pulverized bentonite, which reaches this point of saturated fluid suspension (in this case semi-solution) at minimum specific gravity for such a fluid. The other extreme of the materials ordinarily used is oxide of iron, which attains the maximum specific gravity at its point of saturated fluid suspension. Between these extremes there are limitless combinations which may be controlled at will by the proper proportioning of the colloidal matter and the pure clays or other minerals.

For the removal of cuttings from the hole and for cooling and cleaning the bit, the lightest mud that, at the upward velocity given it by the pump, can float the cuttings out is satisfactory; but in order that its burden may not settle back toward the bottom when the pump stops, it must be sufficiently viscous through gelling to hold the cuttings in suspension, or at least to permit relatively slow settling. If this fluid is to serve the bit as sticky shale or gumbo is being penetrated, then it must be substantially below its point of saturated fluid suspension in order that more mud-forming particles may be taken up.

In the protection of shale walls from caving, weight and the ability to "set" or gell as movement ceases are required; i. e., a mud made of high-specific-gravity clays with fair colloidal properties should be used. If sands are to be "mudded" off, then muds built of clays having high tensile strength in plastic form are most suitable. As the drilling fluid passes upward through the hole, the fluid velocity at the wall is substantially less than in the center of the

GREEN STRAND *for* Rotary Drilling



● Hazard's LAY-SET Preformed Green Strand is preferred by an ever increasing number of drillers because:

1st—LAY-SET Green Strand is made of Improved Plow Steel—the true *service metal* for rotary lines;

2nd—LAY-SET Green Strand is preformed.

In LAY-SET Preformed Green Strand Rotary Lines there are no life-shortening stresses; no cranky resistance. Being preformed, LAY-SET Green Strand lines are . . . much easier to thread through the traveling block, crown block, and eye in drum. . . . do not have to be back-twisted. . . . whip less at high speeds. . . . spool tightly, even under the light weight of the idle block. . . . resist kinking and require no seizing.

These several features, characteristic of LAY-SET Preformed Green Strand, mean longer service life, lower replacement labor costs, fewer shutdowns, steadier drilling.

Write for complete details.

HAZARD WIRE ROPE COMPANY, Inc.
Wilkes-Barre, Pennsylvania
An Associate Company of the American Chain Company, Inc.

In Business for Your Safety
Branches or Distributors in all Oil Field Centers

GREEN SIGNIFIES SAFETY

LAY-SET *Preformed* Rotary Lines

ALL HAZARD WIRE ROPES MADE OF IMPROVED PLOW STEEL ARE IDENTIFIED BY THE GREEN STRAND

SEE THESE BAKER TOOLS

1 BAKER CEMENT FLOAT SHOE
2 BAKER CEMENT FLOAT COLLAR
FLOAT
THIS END DOWN
3 BAKER CEMENT WHIRLER SHOE
4 BAKER CEMENT GUIDE SHOE
5 BAKER MODEL F CEMENT RETAINER

A hearty Baker Welcome awaits all visitors to the Tulsa Exposition, May 16 to 23, 1936! In Booths 99 and 112 of the Oklahoma Building, full size models, and moving displays will be demonstrated by Practical Baker Representatives. You are cordially invited to pay us a visit!

1

With the adoption of "red" concrete as standard, Baker Cement Float Shoes provide maximum efficiency. The Bakelite ball valve double-seals against rubber backed by Bakelite at the slightest reversal of pressure; the special made shoe, with plug and valve made of Bakelite and Baker-formula concrete, is stronger than the casing; the complete "drillability" of both concrete and Bakelite eliminates any delay or danger when drilling out and drilling up — absence of metal leaves the hole always ready for immediate coring or "straight-hole" drilling.

2

Many operators use a Baker Cement Float Collar to stop the cementing plug a joint or two above bottom and retain cement "tailings" *inside* the casing. Internal construction is the same as the Baker Cement Float Shoe, and all advantages are retained. Used with a Baker Cement Guide Shoe for average length strings, or with a Baker Cement Float Shoe where an extra measure of safety is desirable.

3

More and more operators are adopting the Baker Cement Whirler Shoe as the "ultimate" device of its kind. It includes all the features of efficiency and safety present in the Baker Cement Float Shoe, with a "plus value"! A number of baffled side ports lead out from the valve chamber and serve to direct the cement upward with a whirling motion that insures complete, even distribution around the casing and minimizes danger of channeling.

4

Baker Cement Guide Shoes possess the vital Baker Drillability feature, and are used in combination with Baker Cement Float Collars, described above.

5

The Baker Model F Cement Retainer with Circulation Jar provides for the placement of cement in a well, under pressure, through tubing or drill pipe. Particularly adaptable where circulation cannot be secured, or can be broken only under great pressure; also used as

BAKER

at TULSA

a Casing Bridge Plug. This efficient device is applied for Re-Cementing, Series Cementing, Cementing Behind Sections of Pipe, Plugging off Bottom Water or Plugging Back to Upper Zones, and other uses.

6

Baker Rotary Wall Scrapers are being universally used for (a) scraping rotary mud from the productive sand for bringing in a bigger well easily and in less time; (b) enlarging the hole to permit placing of a thicker body of cement around shoe and casing; (c) wall-scraping a larger diameter for setting casing in "tight" holes, or running liners without turning down couplings; and many other purposes. The blades are opened by hydraulic pressure from the pumps, and always close when their work is done — thus providing maximum safety.

7

The advantages of a back-pressure valve in the drilling string are well known, but not until the "threadless valve" was introduced in the Bakwik Drill Pipe Float were operators unanimous in approving such devices. The Bakwik Float body need not be removed from the string at any time, as the valve assembly is quickly and easily removed or replaced by hand. Its many advantages are described in the Baker Catalog, and on Pages 205 to 207 of the 1936 Composite Catalog.

8

The Baker Rotary Wall Sampler takes *cores from the side walls* of a drilled hole, operating at any depth in a safe and efficient manner. The complete Wall Sampler is a "double value" investment, since the body is identical to the Baker Rotary Wall Scraper and by *changing blades only* you can perform the many profitable operations described under Paragraph 6 above.

9

The Baker Cable Tool Core Barrel is unequalled for taking cores from all formations by the cable tool method. Accurate, complete cores are secured at low cost, and any experienced driller can operate it successfully.

General Offices and Plant

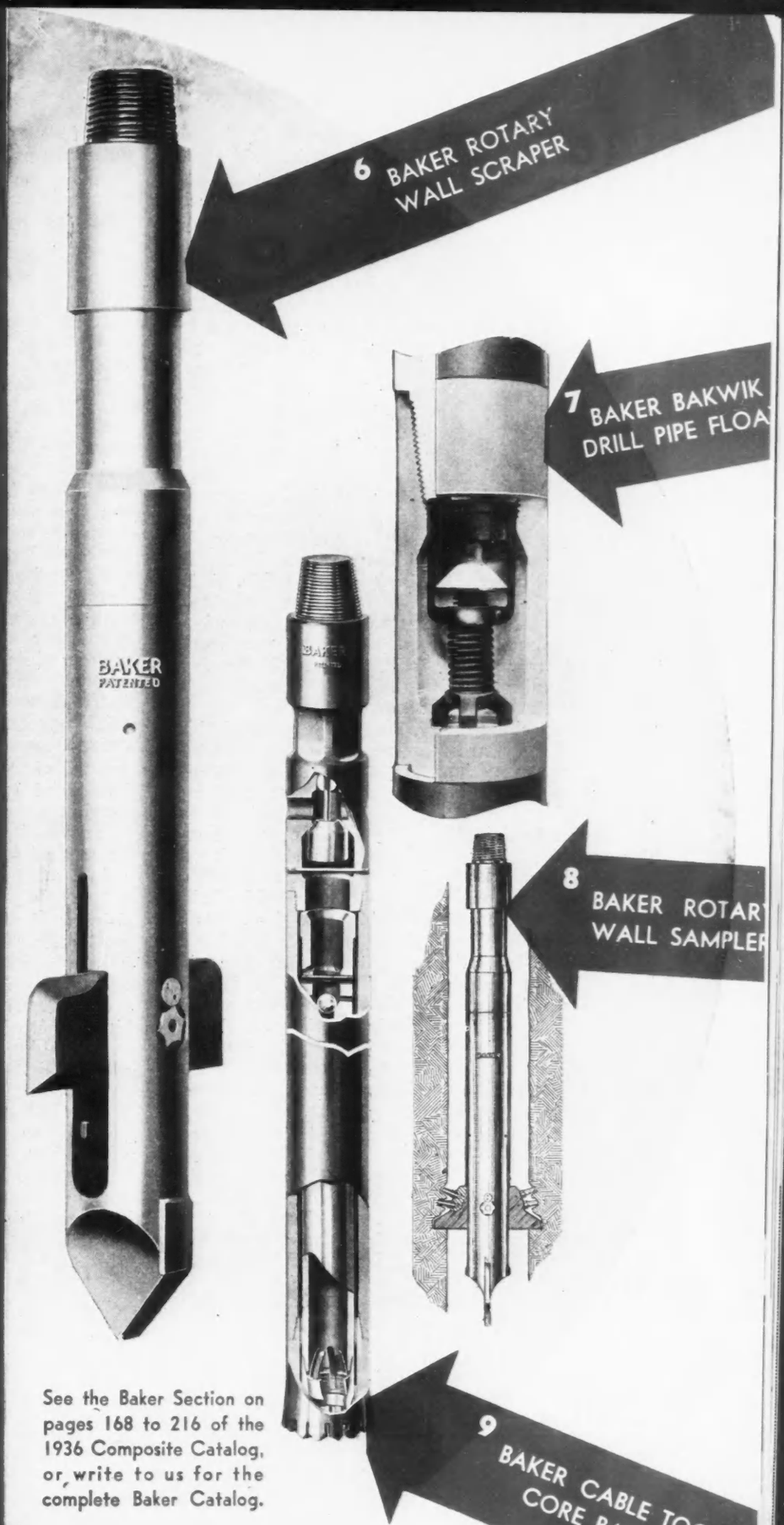
BAKER OIL TOOLS, INC.

2159 East Slauson Ave.
Mail Address: Box 71
Huntington Park, California

A new, modern factory, warehouse and office now nearing completion at—
HOUSTON, TEXAS

Sales Office and Warehouse at—
Tulsa

Sales offices at:
Shreveport; Midland, Texas; Oklahoma City; New York City; Coalinga, Taft and Bakersfield, California


6 BAKER ROTARY WALL SCRAPER
7 BAKER BAKWIK DRILL PIPE FLOA
8 BAKER ROTAR WALL SAMPLE
9 BAKER CABLE TOOL CORE BARREL
BAKER
PATENTED

See the Baker Section on pages 168 to 216 of the 1936 Composite Catalog, or write to us for the complete Baker Catalog.

OIL TOOLS

INTERNATIONAL PETROLEUM EXPOSITION 1936 WORLD'S FAIR TULSA, U.S.A.

hole; in fact, in immediate contact with the wall there is no movement. This part of the fluid against the sand loses some of its water to the sand, until its point of saturated fluid suspension is exceeded and the mud attains plasticity. This desiccation of the mud to the point of plasticity continues, and the plaster thickness increases. This is particularly true in deep holes where desiccation seems to be more rapid than at shallower depths. Above some unknown depth, the plaster does not seem to build up to that thickness which is likely to give trouble; but at greater depths, such as in the Temblor sands of Kettleman Hills, desiccation is so rapid that even after a few hours' time the plaster thickness is such that the bit has to be pulled through it and, occasionally, a "ball" is built up on the tool that makes it necessary to rotate and circulate out. This is particularly true if high-tensile-strength clays are used. The more nearly pure, light-weight aluminum silicate clays form plaster coatings of low tensile strength in deep holes and seem to be better adapted to the conditions than heavy clays high in iron oxide. A low-specific-gravity clay that forms a mud-laden fluid that reaches its point of saturated fluid suspension at about 74 pounds seems to be the best yet used for deep-sand drilling. A weight of about 73 pounds per cubic foot and a viscosity of about 30 seconds (Marsh funnel) seems to be the correct mixture. Further, these low-specific-gravity, low-tensile-strength, highly-colloidal clays are more readily cleaned from the producing sands than are those of high tensile strength in plastic form. The actual permanent mudding-off of production seems doubtful under normal conditions, particularly when brittle clays are used. Penetration probably rarely exceeds a small fraction of an inch; and when the pressure of the fluid column at the bottom of the hole is decreased by bailing or swabbing, it seems probable that the sands are cleaned of all foreign mud particles.

As drilling depths increase, desiccation of the drilling muds will probably likewise increase. It would be extremely interesting to see some of the deeper wells drilled into the producing horizons with fairly viscous muds built of low-specific-gravity-clays with mud weights just sufficient to counterbalance the pressures in the sands. The presence of considerable gas may offer problems in the test.

Substantial progress has been made recently in the treatment of mud-laden fluids with chemical reagents to promote some desired physical character, such as those used to reduce viscosity by control of the colloidal properties of the fluid. No chemical for field use seems to have been found that will impart to the mud that character given it by the colloidal properties of a clay or hydrous mineral such as bentonite. Other reagents, such as lime and sodium silicate, are used for special problems where a very stiff non-pumpable mud is required. These are usually spotted where needed in the hole.

Summary

The fluid delivered to the bit is of primary importance in both volume and character.

Assuming the proper cutting tool is being used, probably the next most important factor in the drilling operation is the weight supported by the bit. Weight to be carried is controlled by the size of the cutting tool, the size and strength of the drilling shaft, the weight of the drill collar, rotating speed, fluid volume, and the nature and attitude of the formations being penetrated. In many formations the greater the weight, the more rapidly hole can be made—all other factors being adequate, and within the limitations of the other requirements. This is not true, however, in all strata; the much discussed Brown shale of Kettleman Hills being a case in point.

Another extremely important factor is rotating speed; while its subsidiary, torque, is likewise important as affecting the work capacity of the drilling shaft.

The proper type and dressing of the bit is, of course, necesary to efficient drilling.

Each of the four factors is definitely controlled or influenced by the others; and, in order to obtain maximum economy and efficiency in any drilling operation, it is absolutely essential that all of them be applied in their proper balanced values. These values must be learned.

Expressed differently: for maximum drilling efficiency there is required an adequate volume of mud-laden fluid of the proper physical and chemical consistencies, the proper weight on the bit constantly and uniformly maintained, a regular and smooth feed or rate of descent of the bit into a given formation, a smooth and delicate rotating power—the most suitable bits for the materials being cut—and above all, intelligence in the selection and perseverance in the application and maintenance of these various factors in their correct values. It is doubtful whether anyone can say definitely what these values are or should be in any but very simple problems. I would urge the extreme importance of taking such steps that may be necessary to ascertain the proper values of these all-important factors of the process of boring a hole into the crust of the earth in the search of oil or gas.

Pressure Completion

OF WELLS IN THE FITTS LOOP

By K. R. TEIS
E. H. Moore, Inc., Tulsa, Oklahoma

THE author first describes briefly the characteristics of the Fitts pool (Oklahoma); then describes the application thereto of pressure drilling, using water or gas rather than mud-laden fluid; points out the advantages and disadvantages, with descriptions of special equipment used; and concludes that the additional expense (approximately $3.00 per foot) over conventional drilling is justified by results obtained.

This paper was presented before the Mid-Year Meeting of the American Petroleum Institute Division of Production, May 14, 1936, Tulsa, Oklahoma.

COMPLETION of wells in the Fitts pool, Pontotoc County (Oklahoma) has been carried out by three methods: 1, cable tools; 2, rotary, using mud-laden fluid; 3, rotary, with pressure control. This paper deals with the last of these methods, and summarizes the experience gained through the drilling-in and deepening by pressure control of some 80 wells in that pool.

The high formation pressure encountered in the previous sands of the pay sections was discouraging to the use of cable tools for drilling-in operations. A method of rotary drilling which would make possible progressive testing of the various pays of the productive section appeared to be a solution to the problem. The pressure-control method of rotary drilling used in the Big Lake pool of Reagan County (Texas) was first investigated, with the result that equipment was purchased and the first well was completed by this method in the Fitts pool in March, 1935. Since that time approximately 50 wells have been drilled in, and 32 wells have been deepened with pressure equipment. The writer here presents such information obtained in this work as is believed to be of practical value to those interested in the process, and particularly to those who anticipate its use.

General Features of Fitts Pool

The selection of pressure-drilling equipment and the mode of its operation must of necessity be varied to meet conditions peculiar to any given area; therefore, a short description is here given of the general features of the Fitts pool. The sections now known to be productive of oil include the following formations:

Hunton Lime
Viola Lime
Bromide Formation
McLish Formation
Wilcox Sand.

The geological log (Figure 1) shows the nature of the producing sections. The part subjected to pressure drilling consists of the Viola lime, Bromide formation, and McLish sand—totaling from 500 feet to 750 feet in thickness.

The formations indicated above are those already proven to be productive of oil. Shallower formations, such as the Atoka and Cromwell, are productive of gas in commercial quantities.

Early in the life of the pool the Oklahoma State Conservation Department, through an order of the Corporation Commission, declared the Hunton lime a separate source of supply, and that section from the top of the Viola lime to the base of the Bromide formation a second separate source of supply. The Hunton lime, while giving promise of valuable oil reserves, has remained undeveloped to a large extent, for the reason that the Viola, Bromide, and McLish formations promised more prolific production.

For several months, after inauguration of intensive drilling operations in the pool, Viola-Bromide wells were stopped at the top of the McLish formation. In April, 1935, E. H. Moore's Mitchell 1 was drilled with pressure equipment to a depth of 305 feet in the McLish formation, with an increase in hourly production of from 37 barrels to approximately 463 barrels, a net production from the McLish formation of 425 barrels per hour. This demonstrated the possibilities of the McLish as a producing horizon, and in a very practical way justified the pressure method of drilling; for had Mitchell 1 been drilled with conventional rotary and washed in in the usual manner, this substantial McLish production would, without doubt, have been allocated to the Bromide section, for the reason that microscopic examination of the samples from this well indicated more favorable sands in the Bromide section (Figure 2).

The discovery of prolific pays in the McLish brought about a revision of the contemplated casing program, in that the McLish horizon was placed in the same common source of supply as the Bromide —making possible producing of the Viola-Bromide and McLish sections through a common string of casing. This brought about the necessity of drilling many of the Bromide wells to greater depths, which work has been carried out by the use of pressure equipment.

In wells completed in the Viola-Bromide-McLish horizons, casing is set in the top of the Viola lime; and the section between that point and the top of the Wilcox lime, or to a depth considered to be safely

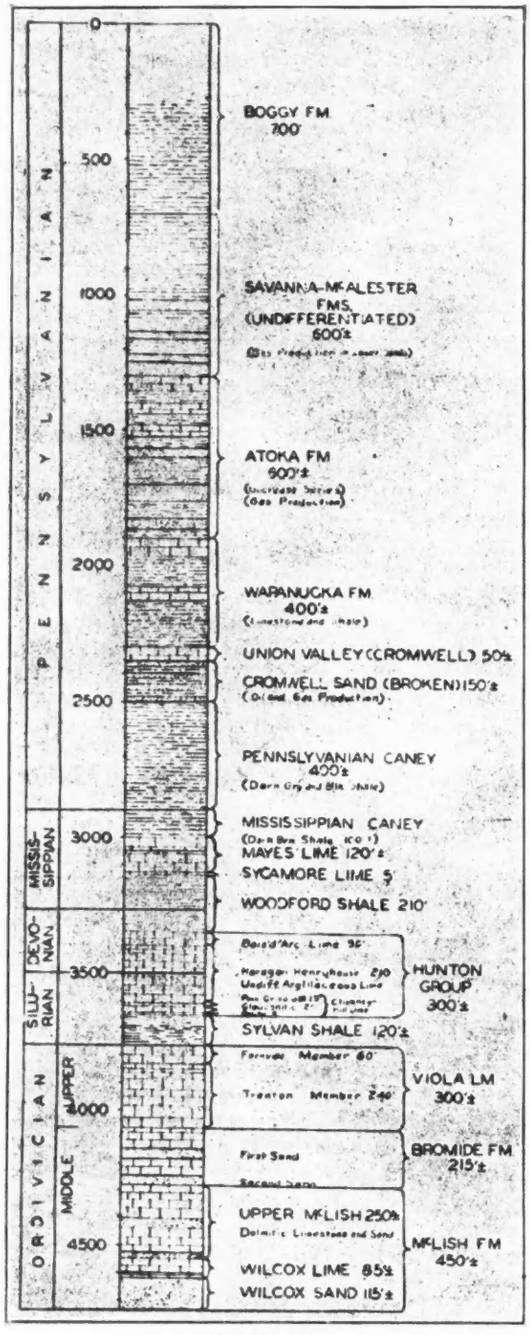


FIGURE 1
Generalized Section of Fitts Pool.

above water level, is drilled by the pressure-control method. At higher points on the structure a section of some 700 feet is included. This is all open-hole in the completed wells. In view of the extreme depth of this productive section, it is of considerable importance to have reliable knowledge of the principal sources of the well's production. Through the use of the pressure-drilling method it has been possible to log accurately the well's productivity at progressive depths.

The discovery of deeper production of the true Wilcox came about through the pressure drilling of that zone in the Atkins 3. As the Wilcox section was drilled, an increase in production of 270 barrels per hour was determined for the upper Wilcox stringers and the first 25 feet of Wilcox sand. The The lower 50 feet of loosely-cemented Wilcox sand brought about an additional increase of some 360 barrels per hour. Had this well been completed in the conventional manner, the productive ability of the Wilcox could not have been determined—and there would still exist considerable uncertainty as to the importance of the Wilcox as a potential source of oil (Figure 3).

Pressure-Control Drilling in Fitts Pool

Pressure-control drilling as practiced in the Fitts pool, described fully hereinafter, is essentially as follows: The mud-laden fluid of the conventional rotary process is replaced with either water or oil. This lighter-weight fluid is aerated with gas, so that the pressure thereby imposed against the formation being drilled is materially less than that existing in the formation. As a result, the well is kept alive during the drilling-in period, which permits progressive testing of the well's productivity and places the well in a condition such that penetration of additional oil- and gas-bearing zones brings about measurable increases in oil and gas produced while drilling.

Substitution of the lighter drilling fluid for the heavier mud-laden fluid makes necessary mechanical prevention of blow-out. This is accomplished by packing-off around the rotating drill pipe.

Gas in and out of the well is accurately metered, and oil production carefully gaged. Throughout these measurements it is possible to detect increases in production of oil and/or gas, to log the depth of the increase, and to determine the magnitude thereof, by actual production tests.

Advantages and Disadvantages of the Method

The advantages are:

1. Accurate logging of pay zones as to position in the producing section and as to productivity.
2. Elimination of the hazard of mud intrusion.
3. Reduction of bit wear.
4. Increased drilling speed.
5. Cleaner samples, more accurately logged.
6. More accurate determination of water-bearing strata.
7. Commercial status of well known at any depth while drilling in.

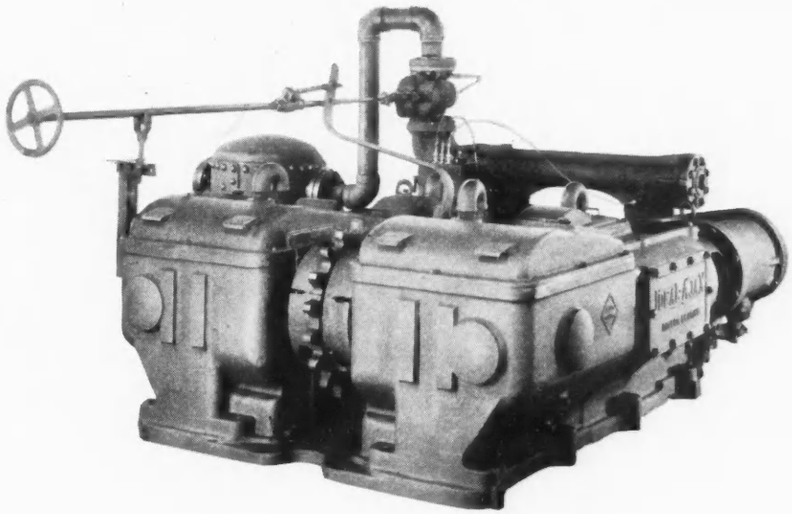
Its principal disadvantages are:

1. Increased cost of drilling due to:
   a. Additional rigging-up expense.
   b. Investment in additional equipment.
   c. Increased down-time due to testing, snubbing operations, etc.
   d. Increased labor expense.
2. Increased danger from caving formations as a result of reduced back pressure and absence of wall-building qualities in circulating fluid.

The chief value of the process in the Fitts pool lies in the fact that it permits of accurate logging of the productivity of the various zones in the extremely-deep pay section of that field (see Figures 2 and 3). Information included in these logs: *a,* makes possible evaluation of the various pay strata; *b,* indicates the point at which water has been encountered; *c,* permits correlation of sands with productivity; and, *d,* furnishes a record which will greatly assist in intelligent operation of the well throughout its productive life.

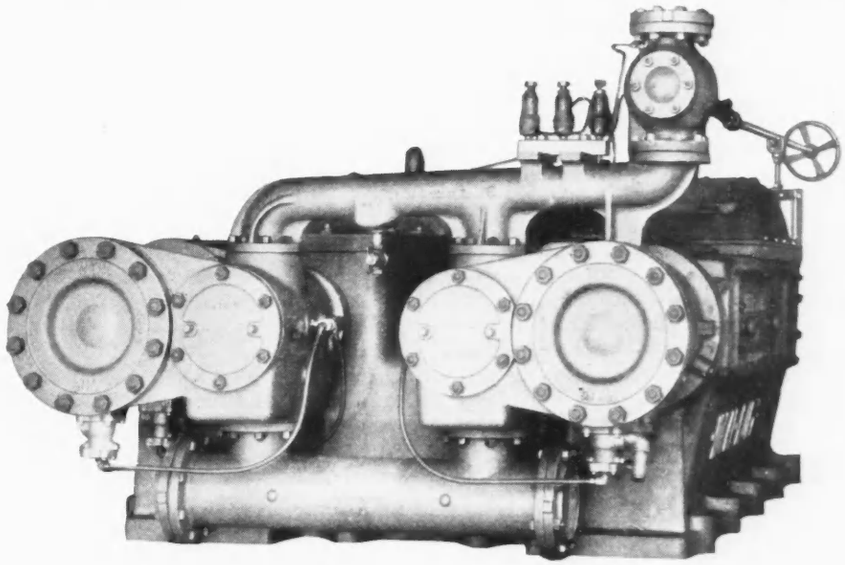
The value of the method in the prevention of mud intrusion depends upon the nature of the producing

IDEAL-AJAX STEAM ENGINES STEADILY IMPROVED



12 x 12 IDEAL-AJAX
Steam Drilling Engine

14 x 14 IDEAL-AJAX
Steam Drilling Engine



FEATURES:

—combination throttle and reverse lever control.

—DSB (double seated) balanced throttle valve.

—three-feed, forced-feed mechanical cylinder and valve lubrication.

—automatic cylinder relief or dump valves.

—automatic manifold bleeder valve.

—metal piston rod pressure, oil and water packing.

Made by AJAX IRON WORKS
Corry, Pa.

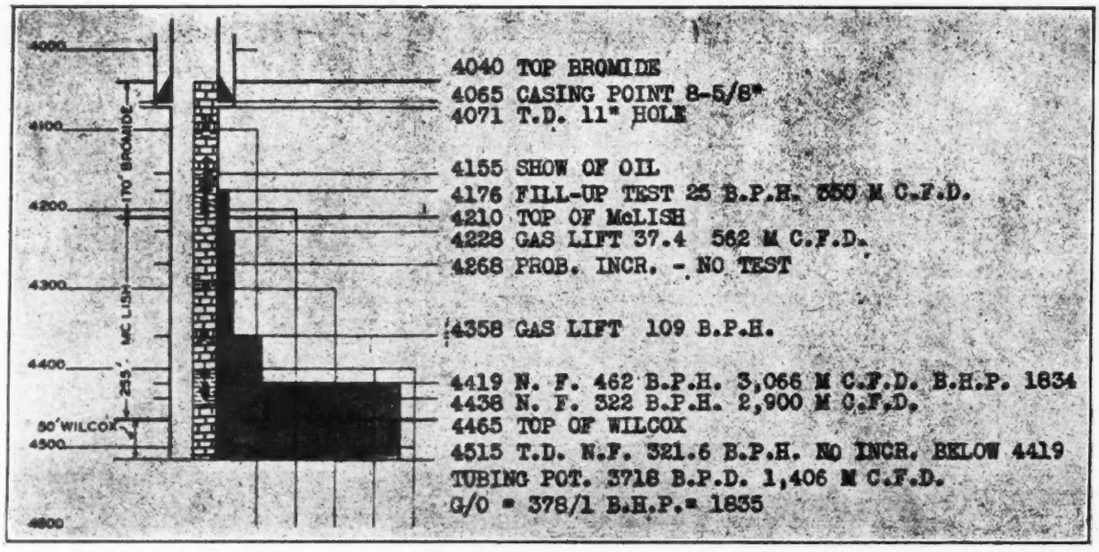


FIGURE 2

Initial production in barrels per hour. N. F.—Natural Flow. Pot.—Potential. Completion Log—Mitchell No. 1

sands as to permeability and formation pressure, the character of the drilling mud, and perhaps other factors more difficult of determination. Up to the present time there is little indication of rotary mud having damaged the pay in wells completed by conventional methods. It is thought that formation pressures have been sufficiently high either to prevent the intrusion of mud to a harmful degree, or to bring about displacement of mud in the first few days that the well is on production. However, with lowering of pressures in the field, the danger of mud intrusion will increase—and use of the pressure-control method become more valuable in this respect.

The formation cannot be damaged by penetration of the drilling fluid. The well is kept alive during the period of drilling in; pressure differential between formation and drilling-fluid column is maintained at near 500 pounds per square inch during the drilling period; and the formation is allowed to produce at all times. Thus the method assures complete freedom from the danger of harmful effects of drilling mud.

In an effort to determine comparatively the action of drilling mud on some of the earlier wells drilled in the Fitts pool, Figure 4 has been prepared, showing decline curves on 11 wells—5 of which were drilled with pressure equipment and 6 of which were washed in after drilling in with mud. It is noted that the five pressure-drilled wells had an initial tubing potential of 3271 barrels per day, as compared with a tubing potential of 3405 barrels per day for the wells drilled in with conventional rotary. As this comparison covers only a few wells, deductions made are not conclusive. They do indicate, however, that wells drilled during this period suffered no material ill effects by reason of mud intrusion. It is impossible to make comparison as between later wells, as all have been completed with pressure equipment.

Substitution of oil or water for the rotary mud has resulted in faster drilling speed and greater footage from bits. Ten wells drilled in with mud used a total of eighty-two (82) 6¼-inch cone bits in drilling a total of 4886 feet of formation, an average of 59.6 feet per bit. Ten wells drilled with pressure equipment required sixty-one (61) 6¼-inch cone bits in drilling 5134 feet of formation, an average of 84.2 feet per bit. This is an increase of approximately 41 percent in footage drilled per bit.

A comparison of five wells drilled in with mud, with the same number drilled with pressure equipment, indicates an increased drilling speed of approximately 24.6 percent in favor of the pressure method—the mud-drilled wells averaging 5.08 feet per hour, as compared with 6.33 feet per hour for the pressure-drilled wells. Comparison of bit footage and drilling speed is made on wells drilling a 6¼-inch hole and being located in the same general area of the field.

Samples of drill cuttings are of better quality in the pressure-drilled wells, for the reason that the hole is kept clean at all times—the bottom-hole cuttings coming from the well uncontaminated by material usually held in suspension in drilling mud. As the return of cuttings to the surface is much more rapid in the case of pressure operation, samples are more accurately logged as to depth. Both of these advantages are of considerable importance to the geologist.

The value of having complete knowledge of a well's productive status as drilling proceeds cannot be too greatly stressed. In the case of edge wells, bearing an uncertain water level, exact knowledge as to the productivity of formations above that level makes possible more logical drilling-in procedure. Hazards of drilling deeper may be avoided in many wells if the production size of the well at shallower depth is known to be substantial. On the other hand, drilling may be logically carried to more hazardous depths in cases where production from formations already drilled is relatively small. Water levels can be much more closely determined, particularly when drilling with oil—as the effect of water entering the hole is immediately evident. Drilling can be stopped with less penetration of the water strata, and the well plugged back in the light of sufficient knowledge to assure exposure of the maximum amount of oil-producing section.

The advantages of the pressure method are offset to a certain extent because the equipment is somewhat more complicated, requiring additional expense in rigging up and moving ahead and additional labor for its operation; also, the cost of high-pressure gas used in aeration of the drilling fluid is an item of some consequence. Exclusive of depreciation charges on pressure-drilling equipment, the cost of hole made with pressure equipment approximates $9.00 per foot in the Fitts pool,

KEEPING IN STEP WITH THE DEMAND FOR GAS *and* MORE GAS

Here's a new 67 ton still being erected with Williamsport Cables for the Eastern States Petroleum Corporation.

We call this to your attention to let you know that our Oil Country Warehouses contain ropes for industrial and construction purposes as well as for drilling operations.

Our Warehouses are ready to meet every Wire Rope requirement. Send for our new Oil Country Catalog of New Lines.

Other Offices in All Principal Cities
MID-CONTINENT SUPPLY CO.
Distributors in Texas, Louisiana and Arkansas
Oil Country Sales Offices
Williamsport Bldg., Fourth and Midland Valley Tracks, Tulsa, Oklahoma
10 North Milby Street, Houston, Texas

WILLIAMSPORT WIRE ROPE CO.

WILLIAMSPORT PA. 122 SO. MICHIGAN AVE., CHICAGO, ILL.

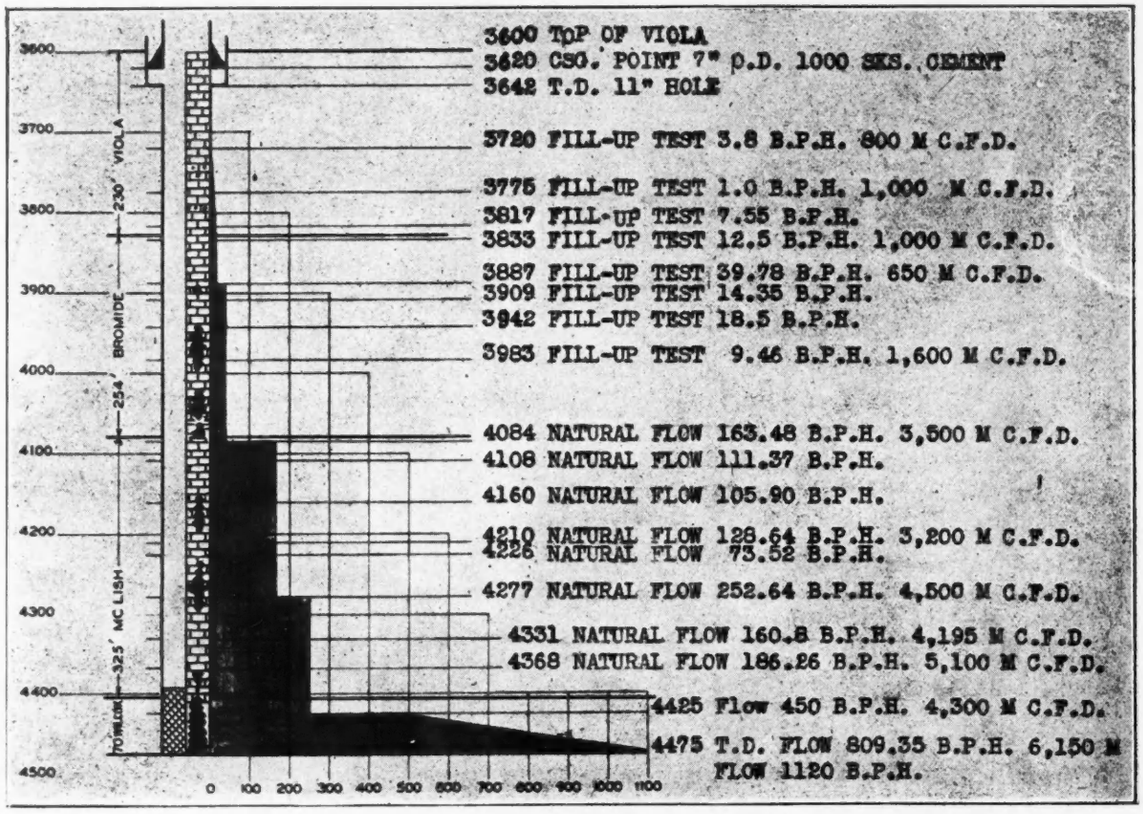

3600 TOP OF VIOLA
3620 CSG. POINT 7" O.D. 1000 SKS. CEMENT
3642 T.D. 11" HOLE
3720 FILL-UP TEST 3.8 B.P.H. 800 M C.F.D.
3775 FILL-UP TEST 1.0 B.P.H. 1,000 M C.F.D.
3817 FILL-UP TEST 7.55 B.P.H.
3833 FILL-UP TEST 12.5 B.P.H. 1,000 M C.F.D.
3887 FILL-UP TEST 39.78 B.P.H. 650 M C.F.D.
3909 FILL-UP TEST 14.35 B.P.H.
3942 FILL-UP TEST 18.5 B.P.H.
3983 FILL-UP TEST 9.46 B.P.H. 1,600 M C.F.D.
4084 NATURAL FLOW 163.48 B.P.H. 3,500 M C.F.D.
4108 NATURAL FLOW 111.37 B.P.H.
4160 NATURAL FLOW 105.90 B.P.H.
4210 NATURAL FLOW 128.64 B.P.H. 3,200 M C.F.D.
4226 NATURAL FLOW 73.52 B.P.H.
4277 NATURAL FLOW 252.64 B.P.H. 4,500 M C.F.D.
4331 NATURAL FLOW 160.8 B.P.H. 4,195 M C.F.D.
4368 NATURAL FLOW 186.26 B.P.H. 5,100 M C.F.D.
4425 Flow 450 B.P.H. 4,300 M C.F.D.
4475 T.D. FLOW 809.35 B.P.H. 6,150 M
FLOW 1120 B.P.H.
VIOLA
230'
BROMIDE
254'
MC LISH
325'
TOWLER
3600
3700
3800
3900
4000
4100
4200
4300
4400
4500
0 100 200 300 400 500 600 700 800 900 1000 1100

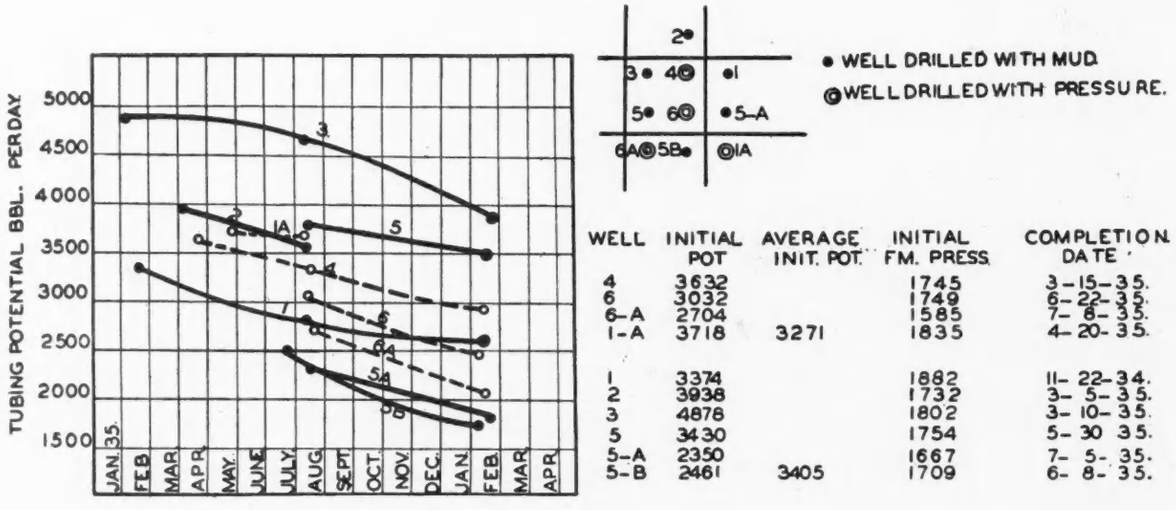
FIGURE 3
Initial production in barrels per hour.
Completion Log—Atkins No. 3.

as compared with the regular contract price of $6.00. This is an increase of approximately $1500 in the average well, or an amount representing 3 percent of its total cost. Unquestionably, this extra expense has been justified in these operations..

Fortunately, the formations productive of oil in the Fitts pool are of such a character that little trouble has been experienced from caving. During the entire pressure-drilling operations, only two cases of stuck drill pipe have occurred, which is little more than would have been expected had the wells been completed with conventional rotary equipment. However, in certain areas this limitation might be of considerable importance—even precluding the use of the method.

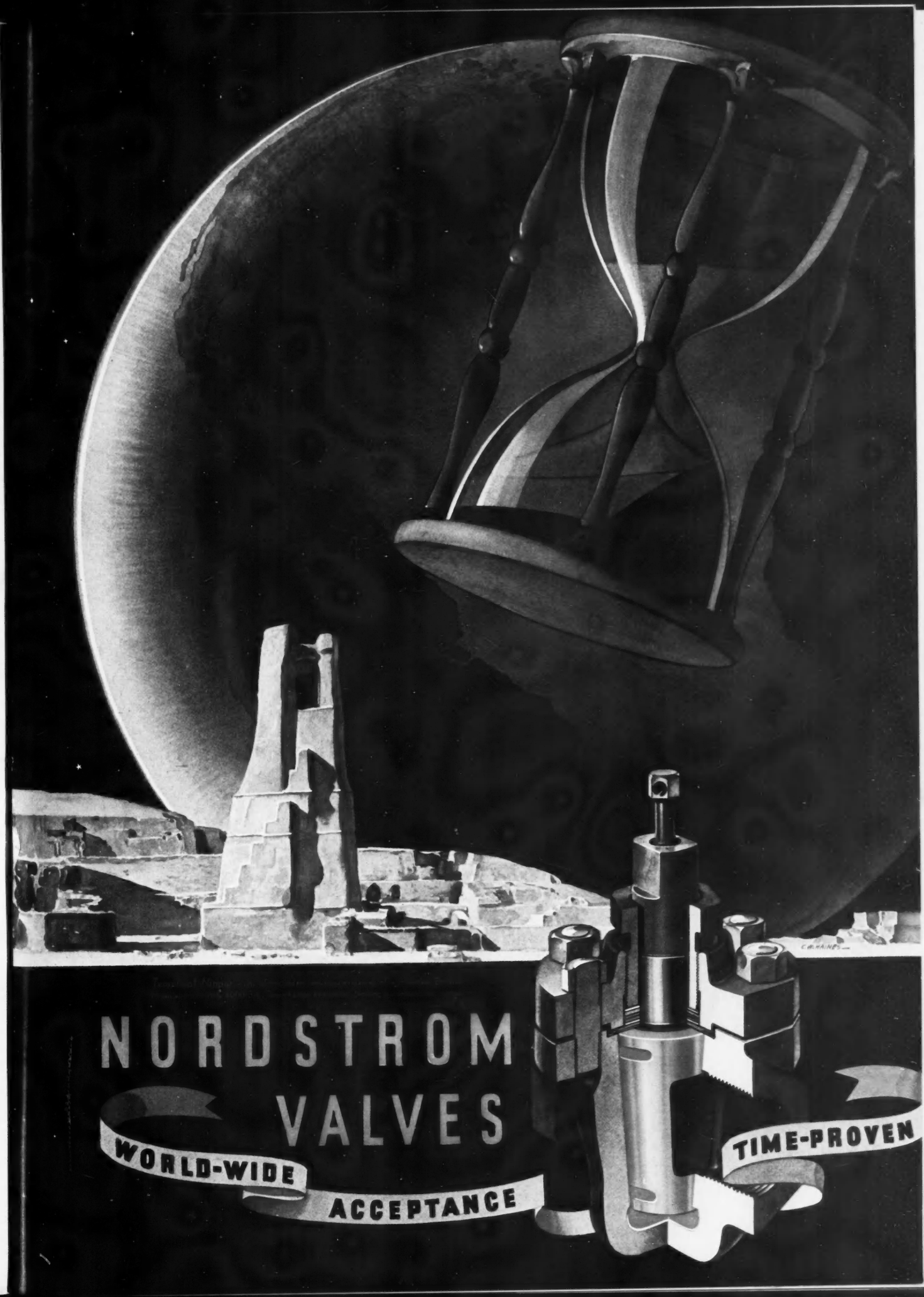
Equipment

The only special equipment, not common to the conventional rotary, is that which is necessary to prevent



WELL	INITIAL POT	AVERAGE INIT. POT.	INITIAL FM. PRESS.	COMPLETION DATE
4	3632		1745	3-15-35.
6	3032		1749	6-22-35.
6-A	2704		1585	7- 8-35.
1-A	3718	3271	1835	4-20-35.
1	3374		1882	11-22-34.
2	3938		1732	3- 5-35.
3	4878		1802	3-10-35.
5	3430		1754	5-30 35.
5-A	2350		1667	7- 5-35.
5-B	2461	3405	1709	6- 8-35.

FIGURE 4


NORDSTROM
VALVES
WORLD-WIDE
ACCEPTANCE
TIME-PROVEN

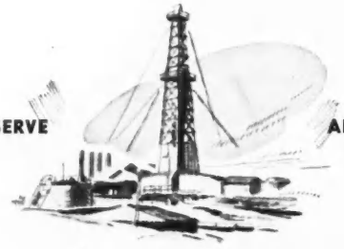
THE PERFECT APPLICATION OF A PRINCIPLE

NOTHING IS CONSTANT BUT

CHANGE

Time changes everything! Mountains erode; continents appear and disappear; the oldest known evidences of architecture yield. Time takes its toll — inevitably. Translated in modern perspective, consider the Petroleum Industry... Plants and equipment of yesterday are antiquated today. Economy of the past is present extravagance. Progress follows in the wake of change. *Valves* are a specific example. New operating demands exact higher levels of performance. Compounded pressures, extreme temperatures, factors of corrosion and countless other drastic conditions must be conquered. Nordstrom Engineers have envisioned these and future needs. They design ahead of contemporary progress. Nordstrom Lubricated Valves are a product of this vision. They have met, and will continue to meet, every challenge. In planning your *valve* installations and replacements, consider Nordstroms for *every* application. . . . . They shall *not* fail!

ONLY **NORDSTROMS** CAN SERVE



ALL MAJOR VALVE NEEDS

MERCO NORDSTROM VALVE CO. *a subsidiary of* **PITTSBURGH EQUITABLE METER CO.**

Main Offices: Pittsburgh, Penna. Branch Offices: New York City, Buffalo, Philadelphia, Columbia, Memphis, Atlanta, Chicago, Kansas City, Tulsa, Houston, Los Angeles and Oakland.

NORDSTROM VALVES

LUBRICATED PLUG

PATENTED "SEALOPORT" LUBRICATION

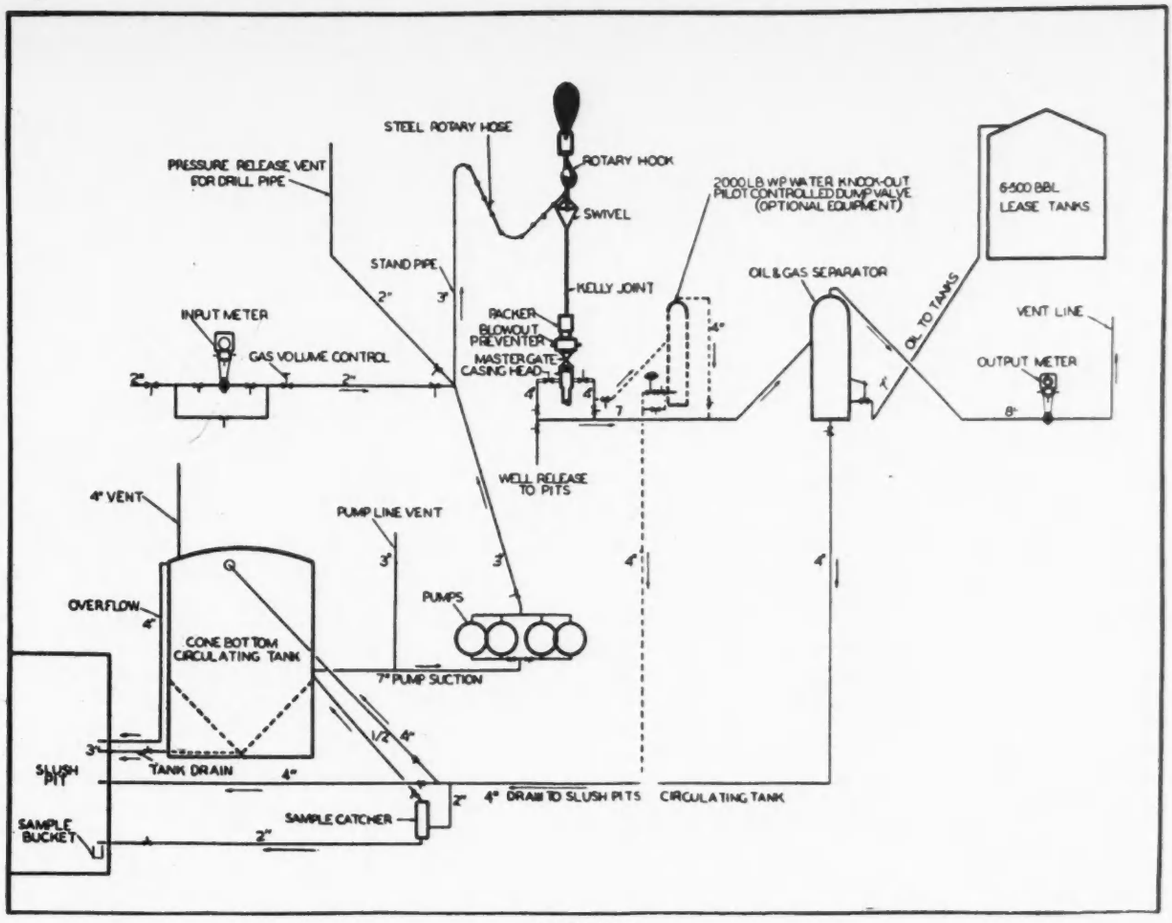


FIGURE 5
Flow Diagram for Pressure Drilling—Fitts, Pool, Oklahoma.

blow-out, together with certain auxiliary equipment as may be required to care for the oil and gas produced during the drilling process. Derrick, cellar, boilers, drawworks, slush pumps—and even the rotary table— may be of the conventional sort.

The special equipment used and the principal features of the process are best explained by means of the flow diagram (Figure 5). The well-head connections consist of a casinghead with two side outlets, above which is placed a master gate of conventional design; surmounted by a ram-type blowout preventor and the drill-stem packing device. Two types of packers, described later, have been employed in the operations at Fitts.

The drilling fluid, either oil or water, is drawn from a coned-bottom tank, and circulated by the slush pumps, as in the conventional rotary method—except that, at the base of the stand pipe, gas (under pressure in excess of that imposed by the pumps) is introduced into the stream of drilling fluid. The input gas is carefully metered through an orifice meter. The aerated fluid circulates in the usual way down the drill pipe, discharging through the side outlets of the casinghead.

From the casinghead the aerated drilling fluid, containing drill cuttings and oil or gas which the well might be giving up, are conducted to an oil-and-gas separator in which separation of the gas from the fluid takes place—the gas being vented to atmosphere after being metered. By comparison of volumes passing the two meters, the amount of gas from the well is determined.

The drilling fluid, in the case of water, is returned (together with the drill cuttings) to the cone-bottomed suction tank, from which it is returned to the well; the cutings dropping out in the tank are drawn off to the slush pit.

In cases where oil is employed as a drilling fluid, the same flow obtains—with the difference that any oil produced above that necessary to maintain circulation is discharged from the oil-and-gas separator to lease storage tanks.

The practice at Fitts is to drill only so much of the section with water as is necessary to give sufficient production of oil to permit of conversion to oil as a circulating medium—usually a production rate of about 100 barrels per hour. The well might just as readily be drilled with water, but for the difficulty of separating from the water such oil as might be produced during the drilling process.

When considerable oil is being produced while drilling with oil, a high-pressure separator, or water knock-out, is used between the well and the oil-and-gas separator (Figure 3). In this case the water and cuttings are returned from the water knock-out separator to the circulating tank, oil and gas passing on to the second separator. Early wells were drilled in with water, separation being made in the manner just described. It was found difficult, however, to obtain complete separation of the oil-water mixture, with the result that much cut oil accumulated during the drilling process. For this reason, in later operations, oil was used as a drilling

fluid as soon as the well was able to produce oil in sufficient quantities to make this possible.

During the drilling process, the well being at all times actively alive, it becomes necessary to restrict the flow from the casinghead; or, in other words, to impose back pressure upon the well. This is accomplished by means of chokes placed in the flow lines between the well and the separator. However, in case the water knock-out is used, the choke is placed on the discharge side thereof, and the well pressure held on the water knock-out to aid separation.

A portion of the drilling fluid en route to the circulating tank is diverted through a small sample trap, in which the cuttings are trapped out—the fluid being discharged to the slush pits. In this manner samples of drill cuttings are caught at desired intervals.

The special technique employed in pressure drilling applies not so much to the actual drilling itself, but principally to those operations resulting from the productive state of the well. As a result, it is necessary for those in charge of the drilling not only to be familiar with rotary drilling in general but, in addition, have knowledge of such matters as the metering of gas, the principles of the gas-lift, flowing characteristics of producing wells, oil-and-gas separators, snubbing equipment, etc.

The packer which encircles the drill pipe and which is mounted on the casinghead is the most important piece of pressure-drilling equipment, for the reason that on it depends the prevention of blow-out during the period in which the drill pipe is in the hole. As mentioned previously, two types of drilling packers have been employed at Fitts—both of which have proved satisfactory. The first packer used was a combination drilling head. This device can be used only with flush-joint drill pipe, and necessitates a special means of drill-pipe drive. It is imminently suited to use where high pressures are known to exist or are expected to be encountered. The second type of packer effects a seal between a rotating square kelly, of conventional design, and the well-head casing. This packer or drilling head employs a square packing gland which, being mounted on ball bearings, is free to rotate with the kelly. As the gland itself rotates, a second set of packing is required between it and the body of the packer. Their principal difference lies in the fact that the first mentioned packer requires the use of flush-joint pipe with a round kelly; while the other head employs the conventional square kelly, permitting the use of standard drill pipe. It is necessary, of course, to pack off around the drill pipe not only while drilling, but also when running the pipe in or out of the hole. As the first packer is used with flush-joint drill pipe, it is a very simple operation to raise or lower the string. The pipe, being of uniform cross-section, passes through the packer without appreciable distortion of the packing member.

The second mentioned drilling head, however, having a square packing member, will not effect a seal around the circular drill pipe. This necessitates the use of a second packing device to permit vertical movement of the drill pipe beyond that permitted by the kelly. This is accomplished through the use of a ram-type blow-out preventer having rubber rams, which are sufficiently yielding to permit passage of the tool joints—the drilling head being disconnected and set aside with the kelly when it becomes necessary to raise or lower the drill pipe. This piece of equipment places a limitation on the system, in that it is impracticable to strip drill pipe through such a device under pressure in excess of about 125 pounds per square inch.

When, during the period of drilling through high-pressure formations, it becomes necessary to withdraw the drill pipe, certain precautions are necessary to prevent the pipe being blown from the hole; for, as each stand of pipe is set back, the weight resisting the well pressure becomes less—until a point is reached at which the pipe would be lifted from the hole if not prevented by mechanical means. The equipment used to prevent ejection of the drill pipe is also employed to force it into the hole against the well pressure when running the pipe in. This equipment is termed "snubbing equipment," and is briefly described as follows: A set of specially-constructed table slips is locked in the rotary table; these slips grip the pipe, preventing its movement either up or down, but are so constructed that they can be released at will. A second set of slips, mounted in a movable yoke, grip the pipe above the table slips.

Means are provided for applying either a downward or upward force to the yoke for the purpose of forcing the pipe into the hole against the well pressure or to retard its ejection. Thus the pipe is held by the table slips while a new hitch is taken with the movable yoke, and in this manner either forced into the hole or snubbed out slowly as the case might be.

As the bit and reamer cannot be passed through the packer, and as it is necessary to close the master gate before withdrawing them, sufficent vertical clearance must be provided between the master gate and the packing device to permit closing of the gate with the bit and reamer below the packer. This space permits the "lubrication" of the drilling and reaming tools into the hole without escape of the well fluid.

Blow-out through the drill pipe is prevented through the use of back-pressure valves, two of which are run on the bottom of the string. Before breaking connection of the kelly with the drill pipe, the high-pressure gas is shut off and the pressure-release valve opened. This prevents the momentary blast of gas and fluid which would result from breaking of the connection without release of pressure.

One of the most important phases of the pressure-drilling operation is the measurement of the gas in and out of the well. This is second only in importance to the tests of productivity; and, in fact, is closely related to the testing, in that the meters often indicate the most favorable depths at which to make tests, at times enabling the operator to judge very closely the point in the formation at which increases in production are had.

Assuming a constant gas-oil ratio in the various formations (and the ratios are approximately constant throughout the pool) the operator can estimate approximately the magnitude of major increases in productivity by noting increases in net gas from the well. The two meters used are standard orifice meters—the one measuring the input gas having a 100-inch, 1000-pound range, while the output meter has a maximum range of 100 inches differential and 100 pounds pressure. These meters are subjected to rather severe service: they should be closely observed by the operator in charge, and should be checked daily to insure proper operation.

The value of the information gained through pressure completion is determined by the accuracy of the productivity test and the judgment used in selecting the test points. The operator is dependent upon the meters to a great extent in selecting test points; however, we have made a practice of testing at intervals not to exceed 50 feet, regardless of meter indications.

Three types of tests are employed, each having its place in the sequence of drilling in the well. These tests are designated as: 1, fill-up test; 2, gas-lift test; and,

IMPORTANT

ANNOUNCEMENT!

We are pleased to announce that in settlement of pending litigation Sperry-Sun Well Surveying Company has granted a non-exclusive license to H. John Eastman and his affiliated companies under the following patents relating to well surveying instruments:

Elmer A. Sperry, No. 1,812,994, dated July 7, 1931, Bore Hole Inclination Recorder;

Elmer A. Sperry, Jr., No. 1,959,141, dated May 15, 1934, Bore Hole Position Indicator;

Williston & Nichols, No. 1,960,038, dated May 22, 1934, Well Surveying Device;

Charles B. Bazzoni, No. 2,012,455, dated August 27, 1935, Well Surveying Device.

This granting of the non-exclusive license in no way represents an affiliation of the two companies.

Sperry-Sun Well Surveying Company and the Eastman Companies will continue to do business independently as heretofore.

Signed:

H. JOHN EASTMAN AND AFFILIATED COMPANIES

SPERRY-SUN WELL SURVEYING COMPANY

Eastman OIL WELL SURVEY COMPANY

Long Beach « Houston « Oklahoma City

S-T-R-E-T-C-H DOLLARS

P&H PIPE HUSTLERS for Faster Handling

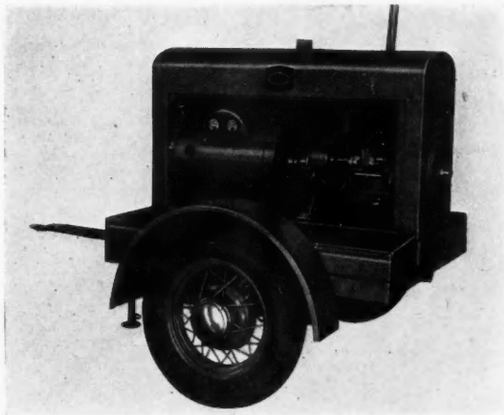
Designed specifically for pipe handling with higher transporting speeds and greater lifting capacity. Unique triple drum arrangement enables working from either side or front; all drums rotate independently with three forward and one reverse speed for easier lowering of pipe. Live power driven boom easily attached for use with any drum. Three travel speeds up to 5.2 m.p.h.; ample power for most severe conditions. The P&H Pipe Hustler turns squarely, maneuvers easily even with heaviest loads. Ask for new low prices.

P&H ARC WELDERS for Field Service

VISIT THE P&H BOOTH BLOCK D

SEE YOU AT THE INTERNATIONAL PETROLEUM EXPOSITION 1936 9TH WORLDS FAIR OF THE OIL INDUSTRY TULSA, U.S.A. MAY 16 TO 23

A brand new 150-amp. portable welder noted for remarkable electrical efficiency, powered by small air-cooled gas engine. Ideal capacity for pipeline welding and machinery maintenance. Simplified operation with single current control over entire welding range. Travel is safe and fast with two-wheel automotive trailer; engine and generator protected from road shocks by rigid all-welded trailer with single bed plate mounting and cantilever springs. Large tool boxes on both sides for carrying equipment and accessories.



Ask for information on the complete line of P&H welders from 75 to 800-ampere capacity; portable and stationary types, AC or DC.

HARNISCHFEGER

4528 WEST NATIONAL AVENUE

OFFICES IN ALL PRINCIPAL CITIES

ON PIPE LINE MILES

P&H TRENCHING MACHINES

Newest Ladder Types

Built for big production. Advanced features include single cast steel frame for main machinery; independent boom crowding device for greater flexibility; 3-speed transmission on bucket line for digging in all types of dirt; 3 travel speeds. Spoil conveyor is power operated, adjustable to any angle; can be shifted to either side. Shock-absorbing clutch protects mechanism from jolts that disable other machines.

WHEEL-TYPE TRENCHES

P&H Model 836-W has greater capacity by measure of wheel buckets, digs deeper than any other machine with the same wheel size. Ask for new low prices.

AT THE OIL SHOW TULSA, MAY 16-23

P&H PRODUCTS FOR THE OIL INDUSTRY

•

Pipe Handling Cranes

Trenching Machines

Backfillers Tampers

Arc Welders

Generator Sets Lighting Plants

Barrel Renovators

P&H BANTAM WEIGHT

MODEL 150 ½ YD. **MODEL 100** ⅜ YD.

A machine that covers the ground quickly, works fast. It's built of new high tensile steels for lightness; all-welded for greater strength; powered by the husky Ford V-8 motor for the lowest operating costs ever known in a machine of its kind. Complete attachments for all types of service are simpler to use, cost less than ever before. See the Bantam Weights at the Oil Show.

CORPORATION

MILWAUKEE, WISCONSIN

WAREHOUSES Dallas Hoboken Jacksonville Memphis Seattle Los Angeles San Francisco

3, natural-flow test. The fill-up test is best suited when the well is making little oil—say between 0 and 20 barrels per hour. The well is unloaded, i.e., the drilling fluid is removed by gas-lift and the well allowed to stand for a period of time during which the oil accumulates in the hole. This oil is circulated out ahead of the drilling fluid and carefully measured. Accuracy in measurement of time and volume is of great importance in the fill-up test. As the amount of oil accumulated in the hole may be small and the period of time short, even small errors in measurement result in gross errors in rates of production. The fill-up test is usually employed at Fitts during the drilling of the Viola section, for the reason that rates of production from this zone are low—approximately 0 to 25 barrels per hour.

The second method of testing, simply a production test by gas-lift, may be most suitably employed when the well's production is substantial but insufficient in amount to give steady natural flow. The gas is introduced at the base of the stand pipe, the well being flowed through the annular space. Close attention to accuracy in gauging and timing is also of importance.

In the third productivity test, that of natural flow, the well is unloaded and allowed to flow naturally through the low-pressure separator. The gas is metered on the vent line to the separator—the oil going to the stock tanks, where it is gauged.

In order that drilling operations may be carried on uninterrupted, once they are begun, it is necessary that sufficient tankage be available to handle the oil produced from the well. At times this is considerable; however, little difficulty has been experienced at Fitts when operating with 3000 barrels of tankage available at the start of drilling-in operations.

The pressure on the well head during pressure drilling varies materially from well to well. The maximum pressure on the well head, during drilling at Fitts, has been in the neighborhood of 200 pounds per square inch. This may increase rapidly, however, if the well is shut in for even a short period of time. In one case pipe was snubbed out when the pressure was more than 1000 pounds per square inch. As a general thing, wellhead pressures while drilling in the Fitts pool may easily be held in the region of 100 pounds per square inch, although on several wells it was difficult to reduce the pressure below 175 to 200 pounds per square inch while drilling.

Adequate fire-extinguishing facilities have been provided, consisting of two foam generators with sufficient length of hose to combat fire which might originate at any point in the operations.

The successful use of the pressure-control method of drilling requires the employment of trained operators. The lack of trained men was the most serious handicap during the drilling of the first few wells. The present organization has carried on some 80 individual operations in an efficient manner and without serious mishap. The process involves the intelligent use of special equipment for the purpose of obtaining certain important information, the protection of producing sand against the intrusion of drilling fluid, and the determination of the well's productive status at various depths while drilling in. All this involves the intelligent manipulation of the equipment, necessitating a thorough understanding of the principles involved and the objective sought. Loyalty on the part of the men engaged in this work, and their earnest application thereto, have made possible the successful completion of the operations to date.

A complete set of records has been kept on each well. These records include the report form (Figure 6) filled out each tour, the orifice-meter charts, and the well log which is plotted upon completion of the drilling. It is believed that these records will prove to be of value throughout the productive life of the well. They contain information which can be obtained at no other time than during the drilling-in period.

The results of pressure drilling in the Fitts pool have justified the additional expense.

WELL NO._____ **PRESSURE DRILL REPORT** SHEET NO._____ DATE_____

TIME	DEPTH	INPUT GAS			OUTPUT GAS			PUMP			SEPARATOR PRESS		SEPARATOR GAUGES		TANK GAUGES		BIT		STEAM	REMARKS
		DIFF	PRESS	VOLUME	DIFF	PRESS	VOLUME	STROKES	VOL	PRESS.	H. P.	L. P.	INCHES	BBLS.	INCHES	BBLS.	WT.	R.P.M.	PRESS.	

TESTS

DEPTH	TYPE OF TEST	TIME START	TIME END	TIME BETWEEN GAUGES DEP.	TIME BETWEEN GAUGES TANK	SEPARATOR INCHES	SEPARATOR BBLS.	TANK INCHES	TANK BBLS.	GAS VOLUME ORIFICE	GAS VOLUME PRESS.	GAS VOLUME DIFF.	GAS VOLUME VOLUME	REMARKS	BIT RECORD SIZE / TYPE BIT NO.	SERIAL	ON AT	OFF AT	FT. PER BIT

OPERATOR

DRILLER

TOUR

CONTRACTOR

FIGURE 6

Back-Side Crank Pumping

By R. E. BRIDGES, Division Engineer,
Humble Oil & Refining Company,
Wichita Falls, Texas

MUCH time would be required to discuss the different items of back-side pumping equipment, such as various types of wrist-pin bearings, stroke posts, knock-offs, swings, jacks, etc. It is assumed we are all familiar with the functions of these standard items; so only a few general remarks will be devoted to their installation. The seven following items cover minor points in the design and construction of a rod-line system. These details add nothing to the cost, and yet effect substantial economy and smoothness of operation.

1. Upright stroke posts should be set so that wrist-pin pitman is approximately level at the middle of up-stroke of well. This will slightly reduce torque on the unit shaft, and lighten load on the bearings (see Figure 1).

2. The pull-rod connection bearing on upright stroke posts should be vertically over rocker bearing at mid-stroke. This will reduce the vertical movement of knock-off pitman to a minimum, thereby minimizing wear of slide bar on knock-off post (see Figure 1).

3. The slide bar through knock-off post should be so spaced that well can be hooked off and on near top of stroke. This will reduce shock on the entire

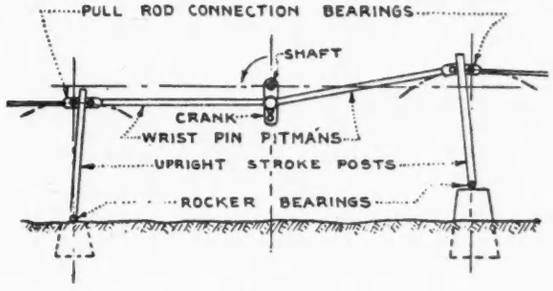


FIGURE 1
Stroke-Post Connection to Back Crank

system, and will also tend to eliminate pull-rod and sucker-rod breaks caused by plunger being sand-stuck in working barrel.

4. Swings and hold-overs should be set as far from knock-off as practicable to lessen the shock on them when well is hooked on and off.

5. Swing post should be set at the intersection of the two planes which are perpendicular to the two lines of pull, to eliminate eccentric loads on swing bearings. In other words, the post should be set

THIS paper is divided into three sections. The first section points out the advantages to be gained by close attention to the details of setting and alignment of rod line equipment connected to back cranks of individual pumping units.

The second section deals with the proper balancing of loads on the unit when one- to four-jack wells are pumped from it. Torque on the unit shaft is used as a basis for analyzing these loads. It is shown that the best operating condition is attained when the torque curves are smooth, with a minimum difference between low and high torque.

The third section emphasizes the savings to be derived from adoption of the catenary curve principle in pull rod line installations. The two definite economies effected are the reduction of friction and elimination of hold-downs in low places. Formulas and examples are given to show the relation between the various factors encountered in the design of sagging rod lines.

It was presented before both the Southwestern District Meeting (Shreveport, April 9-10) and the Mid-Year Meeting of the American Petroleum Institute Division of Production (Tulsa, May 13-15, 1936). The statements and opinions expressed herein are those of the author, and should not be construed as an official action or opinion of the Institute or of this magazine.

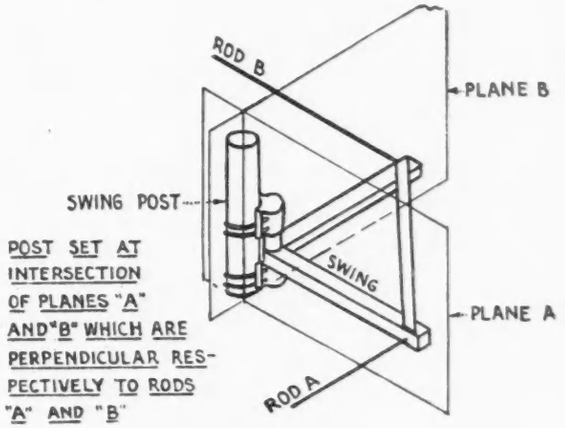

ROD B
PLANE B
SWING POST
POST SET AT INTERSECTION OF PLANES "A" AND "B" WHICH ARE PERPENDICULAR RESPECTIVELY TO RODS "A" AND "B"
SWING
PLANE A
ROD A

FIGURE 2
Swing-Post Setting

plumb only when the rod lines in both directions from swing are truly horizontal (see Figure 2).

6. Swing post should be set a sufficient distance from rod-line intersection so that when swing is

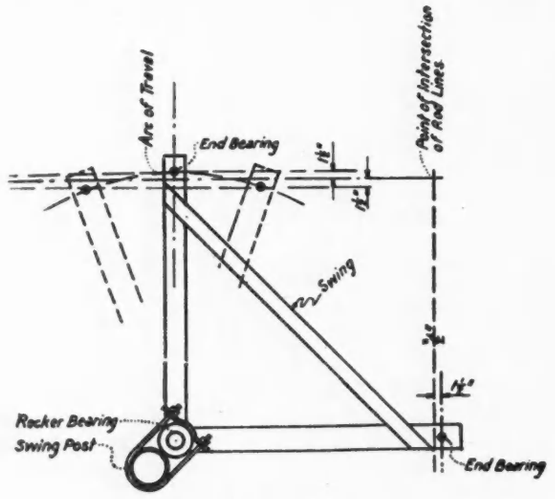


FIGURE 3

mounted the end-bearing connection will be from 1 inch to 2 inches (depending on length of stroke) out of line on the side away from swing post when swing arm is perpendicular to rod line (see Figure 3). This will minimize the angle of bend of rods at the rub post during the pumping cycle.

7. Hold-over post should be set in such position that hold-over arm will bisect the interior angle of rod line at mid-stroke, and that end bearing will be 2 inches to 3 inches (for 20 degrees rod-line angle) outside the point of intersection. This will reduce rod bend at the rub post.

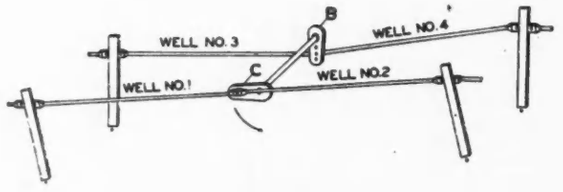


FIGURE 4

Rod-Line Hook-Up to Standard Rig

Crank Positions

Crank positions are important to the proper balancing of rod-line wells. The correct crank position for one or two wells pumping on the back side of a beam well is well known. Consideration will, therefore, be given to the case of a pumping unit set away from any well and used to pump jack wells only. Figure 4 is a sketch of the hook-up. Wells No. 1 and 2 are on the back crank **C**, and wells No. 3 and 4 on the front crank **B**, rotation being in a counterclockwise direction. Figure 5 illustrates a dynamometer card of a representative jack well in the Pampa area, which will be assumed as typical of the four wells considered.

To simplify analysis of the forces acting, consider the net torque on the unit shaft which must be overcome by the prime mover.

A one-well hook-up will be considered first. The torque produced by this well is shown by curve **A** of Figure 6. Curve **B** is the torque produced by a 6500-pound effective counterweight on the other crank, lagging crank **C** by 90 degrees. It is the simple sine

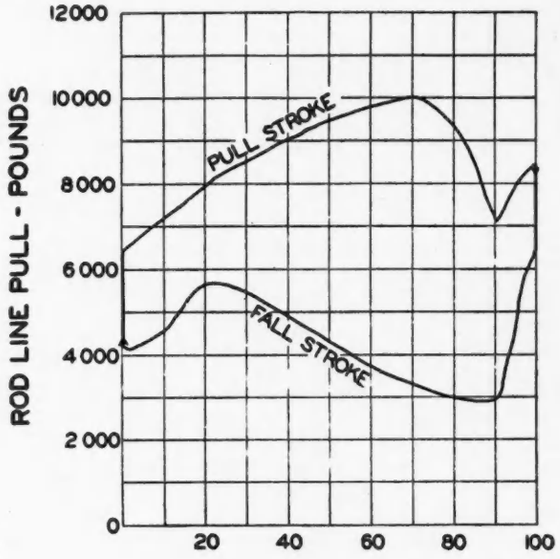


FIGURE 5

Dynamometer Chart of Jackson No. 7

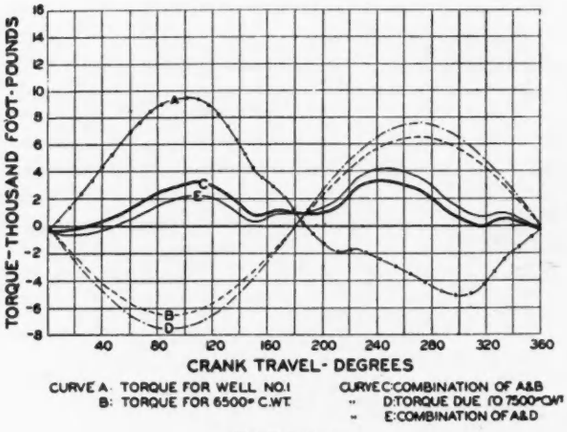

TORQUE-THOUSAND FOOT-POUNDS
CRANK TRAVEL-DEGREES
CURVE A: TORQUE FOR WELL NO.1
B: TORQUE FOR 6500# C.WT.
C: COMBINATION OF A&B
D: TORQUE DUE TO 7500# C.WT.
E: COMBINATION OF A&D

FIGURE 6

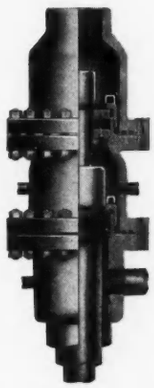
Shaft Torque—One Well

curve. The total net torque on shaft with the well counterbalanced in this manner is shown by curve **C**. This gives two approximately equal peaks of 3300 feet-pounds at about 105 degrees and 240 degrees of crank travel. The equal peaks show that the well is properly counterbalanced, and check the average load shown on dynamometer card. If a 7500-pound counterweight were used, its torque (curve **D**) combined with well No. 1 would be curve **E**.

This gives a peak of 2300 feet-pounds at 105 degrees, and 4200 feet-pounds at 240 degrees; and shows the counterweight to be too heavy. Should the higher peak be in the first half of the stroke, it is evident that the weight is too light.

Forces due to momentum of counterweight have not been considered in this and the following curves

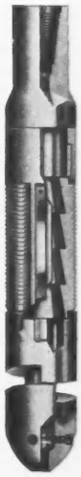
Backed by years of successful use!



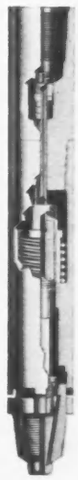
Warren Control Heads

Shaffer Cellar Control Gate Screw Type—6000 lb. Test

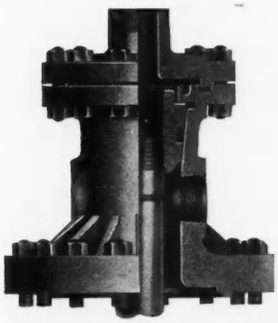
Shaffer-Hamon Sockets



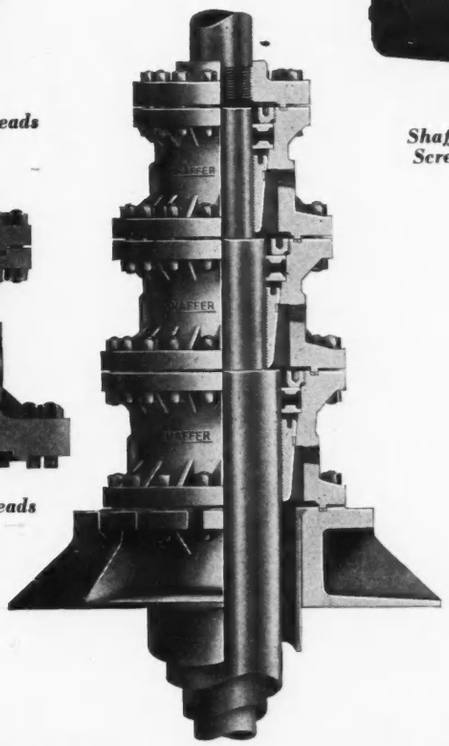
Shaffer-Hamon Spears



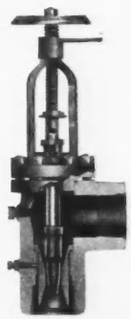
Shaffer Expansion Pin Taps



Shaffer Tubing Heads Type 35



Shaffer Spool Type Landing Heads



Shaffer Adjustable Flow Beans

All over the world operators depend upon Shaffer Equipment for controlling wells from the time drilling commences until after the well is put on production.

Shaffer High Pressure Drilling Hook-Ups, Cellar Control Gates, Casing and Tubing Heads and Adjustable Flow Beans, Spool Type Landing Heads and Production Hook-Ups are superior for handling any pressure that may be encountered in modern drilling.

Shaffer Fishing Tools have been in general use in domestic and foreign fields for many years and are regarded as the most efficient and dependable on the market.

Shaffer Equipment insures safe and efficient operations. Play safe! Use Shaffer tested and proven tools.

SHAFFER TOOL WORKS

Brea, Calif.—Houston, Texas—Export, Oil Well Supply Company

because, although they would change the shape and magnitude of counterweight-torque curves, they would not change the conclusions drawn, and would involve more complicated figures. For very slow speeds, the difference between these counterweight-torque curves and those considering dynamic forces is negligible. However, for higher speeds, the difference is considerable, as shown in Figure 7.

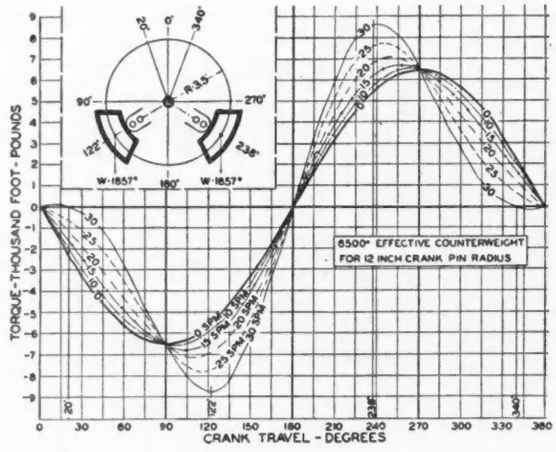


FIGURE 7

Effect of Speed on Counterweight Torque

Figure 8 shows the effect of the counterbalance crank lagging crank **C** an additional 15 degrees. Curve **B** is again the torque of counterweight at 90 degrees lag, while curve **C** is torque if counterweight is at 105 degrees lag—apparently the correct point, because the peak of well No. 1 is at 105 degrees. Curve **D** is the combined torque of the well and counterweight at 90 degrees; while $\mathbf{D}_1$ is a similar curve, except with counterweight at 105 degrees. Although the peaks are lowered slightly in $\mathbf{D}_1$, the negative torque is increased, and stress reversals are practically the same for both conditions. Probably the best position for counterweight for this well would be at 97½ degrees lag. This gives the curve **E** with all torque positive.

It should be noted that the maximum weight on a beam well is usually early in the stroke, while for a rod-line well it is usually past mid-stroke; also that the maximum torque is not necessarily at the maximum weight. For the well considered here, the peak weight is at 70 percent of the up-stroke, or about 115 degrees of crank travel; whereas the maximum torque is at 105 degrees of crank travel. There are also factors in the mechanical hook-up that would change the relative positions of maximum weight and maximum torque. In view of these facts and the slight difference between curves **D**, $\mathbf{D}_1$, and **E** of Figure 8, it is believed that leading or lagging a few degrees is not practical. This is substantiated by the fact that if momentum forces are considered, the low point on counterweight-torque curve would be later in the stroke than 90 degrees. For instance, for counterweight shown in Figure 7, with speed of 20 strokes per minute, this low point would be at about 110 degrees of crank travel.

These curves clearly depict the fact that these two wells can be pumped with an engine of lower horsepower capacity than would be necessary to pump one well not counterbalanced, since instantaneous horsepower is directly proportional to the ordinates of these torque curves.

A two-well hook-up will now be considered. Curve **A** of Figure 9 is again well No. 1 torque, and **B** is torque of No. 2 pumping from the same crank. Curve **C** is the combined torques of wells Nos. 1 and 2. Note that the peak loads are much less than for each well

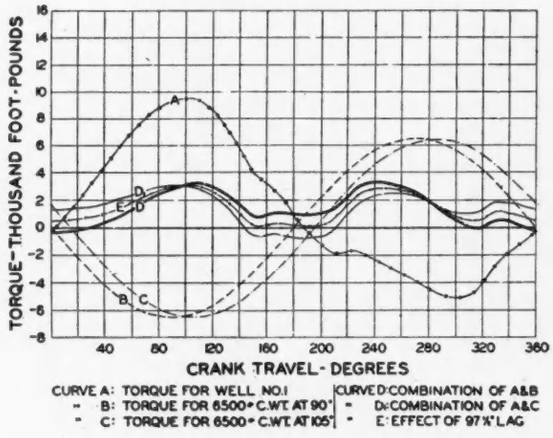

TORQUE-THOUSAND FOOT-POUNDS
CRANK TRAVEL-DEGREES
CURVE A: TORQUE FOR WELL NO.1
" B: TORQUE FOR 6500# C.WT. AT 90°
" C: TORQUE FOR 6500# C.WT. AT 105°
CURVE D: COMBINATION OF A&B
" D1: COMBINATION OF A&C
" E: EFFECT OF 97½° LAG

FIGURE 8

Effect of Counterweight Lag

separately, and the minimum load hardly reaches the zero line.

Curve **A** of Figure 10 represents the torque produced by the combined loads of wells Nos. 1, 2, and 3, with cranks 180 degrees apart. The load is very light, and drops below zero during the first half of the stroke, but reaches a high peak when No. 3 is on its up-stroke. Curve **B** shows the same wells, but with No. 3 crank leading Nos. 1 and 2 crank by 90 degrees. This gives a peak load at the beginning and end of stroke, and is negative about mid-stroke. It a 6500-pound counterweight is put on crank **C**, and its torque combined with curve **B**, curve **C** is obtained; this represents wells Nos. 1 and 2 plus counterweight on crank **C** and No. 3 on crank **B** leading crank **C** 90 degrees. If well No. 3 were a beam well, the correct setting, of course, would be cranks 180 degrees apart with counterweight on crank with No. 3.

Curve **A** of Figure 11 shows the torque produced by four wells with cranks 180 degrees apart. The torque varies from almost zero to a high peak and back again every 180 degrees of crank travel. If cranks are 90 degrees apart, a very uniform load is obtained, as shown by curve **B**.

Summary

The following conclusions are drawn from these torque curves:

1. One well should be counterbalanced on the opposite crank leading or lagging by 90 degrees, depending on direction of well.

2. Two wells on same crank require no counterweight.

3. In a three-well hook-up counterweight should be on the two-well crank and 90 degrees from the one-well crank.

4. In a four-well hook-up cranks should be 90 degrees apart, and no counterweight is necessary.

5. In any hook-up if the net torque can be held

IDECO
HAS THE FACILITIES

MAIN OFFICE, COLUMBUS, OHIO

IDECO FACTORY, COLUMBUS, OHIO

ROOTS-CONNERSVILLE BLOWER CORPORATION
CONNERSVILLE, INDIANA

IDECO FACTORY, BEAUMONT, TEXAS

IDECO FACTORY, TORRANCE, CALIFORNIA

IDECO FACTORY, DELAWARE, OHIO

IDECO FACTORY, MARIETTA, OHIO

STRUCTURAL SHOP, COLUMBUS, OHIO

MACHINE SHOP, CONNERSVILLE, INDIANA

PUMPING UNIT ASSEMBLY SHOP, COLUMBUS, OHIO

FABRICATING SHOP, STACEY BROTHERS GAS CONSTRUCTION COMPANY, CINCINNATI, OHIO

—PLANT CAPACITY—PLANT LOCATIONS—WITH CONVENIENT SALES OFFICES AND BRANCHES IN ALL ACTIVE OIL FIELDS.

The design, construction and application of IDECO products are each based upon the knowledge of every desirable and practical feature known to oil country experience as well as the experience gained in manufacturing heavy machinery for more than eighty years.

IDECO is a reliable organization of financial, engineering, manufacturing, selling and distributing units, operating under centralized management and devoted to the production of Oil Country Equipment—

Oil Well Production Equipment
Geared Pumping Units
Production Derricks
Rotary Drilling Equipment
Cable Tool Drilling Equipment
Rigs and Jacks
Standard Steel Buildings
Special Steel Towers
Stacey Telescopic Gas Holders
Stacey-Klonne Gas Holders
Stacey "Bullet" Gas Storage
Stacey Purifiers
Rotary Blowers and Gas Pumps
Centrifugal Blowers and Gas Pumps
Rotary Vacuum and Liquid Pumps
Turbine Pumps
Rotary Displacement Meters
Inert Gas Producers

—all engineered and produced through the facilities of the IDECO organization.

THE INTERNATIONAL DERRICK & EQUIPMENT CO.
DIVISION OF INTERNATIONAL—STACEY CORPORATION
Beaumont, Texas — Columbus, Ohio — Los Angeles, Cal.

PLANTS
IDECO, Columbus, Ohio IDECO, Marietta, Ohio
IDECO, Delaware, Ohio IDECO, Beaumont, Texas
IDECO, Torrance, Cal.
Stacey Brothers Gas Construction Co., Cincinnati
Roots-Connersville Blower Corp.
Connersville, Ind. and Pottstown, Pa.

DIVISION SALES OFFICES
New York, Beaumont, St. Louis, Columbus, Kilgore
San Francisco, Los Angeles, Pittsburgh, Cincinnati, Tulsa, Buenos Aires
Chicago, Detroit, Wichita, Houston, Dallas, Boston

25 YEARS OF EXPERIENCE IDECO THE WORLD OVER

There is no substitute for Oil Country Experience in Building Oil Country Equipment

IDECO

above the zero line, no power is lost, and there is no stress reversal to cause back lashing of gears or to cause jumping of belt.

6. If depressions can be raised and peaks lowered in the torque curves by counterweighting, a smoother running unit will result with no increase in work done.

Rod-Line Sags

The conventional method of laying pull rod lines is on a uniform grade from power to jack well, line being supported at 25 feet intervals on doweled oak

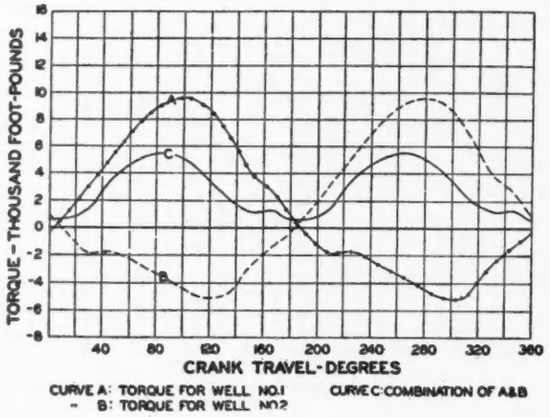

TORQUE - THOUSAND FOOT-POUNDS
CRANK TRAVEL - DEGREES
CURVE A: TORQUE FOR WELL NO.1
B: TORQUE FOR WELL NO.2
CURVE C: COMBINATION OF A&B

FIGURE 9

Shaft Torque—Two Wells

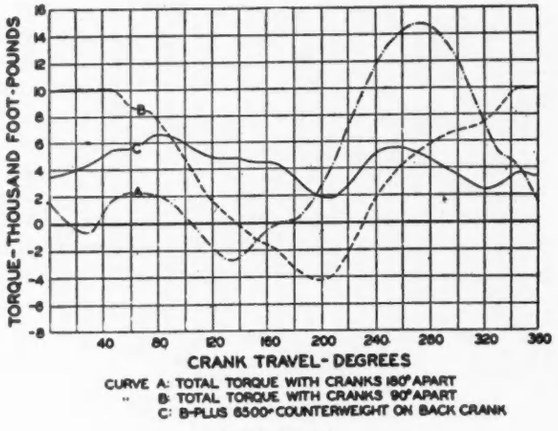

TORQUE - THOUSAND FOOT-POUNDS
CRANK TRAVEL - DEGREES
CURVE A: TOTAL TORQUE WITH CRANKS 180° APART
B: TOTAL TORQUE WITH CRANKS 90° APART
C: B-PLUS 6500# COUNTERWEIGHT ON BACK CRANK

FIGURE 10

Shaft Torque—Three Wells

carriers, commonly known as "doll heads," set in 2 inch pipe stakes. In such an installation each doll head supports the weight of one 25-foot rod and coupling, or about 40 pounds for ¾ inch rods. Since it is a difficult matter to keep doll heads properly greased at all times, the friction between rod and doll head is an important item. Dynamometer tests show that a conservative average coefficient of this friction is about 0.3; or a pull of 300 pounds is required per 1000 pounds of rods to overcome friction. The coefficient is only about 0.1 to 0.2 when doll heads are freshly greased, but it reaches 0.5 to 0.6 after grease has practically worn off.

There are two methods in use to reduce this friction:

1. Roller rod-line carriers to replace oak doll heads.
2. Series of sags in rod line.

The first method is more expensive, but should be more efficient—provided the rollers have well lubricated dust-proof bearings. We have not made sufficient tests and study of these roller carriers, and have no definite data on savings effected by them. They cost about $100 per 1000 feet of rods.

Our company in the North Texas area has used the sag system quite extensively (see Figure 12); since the sags effect a substantial saving in power, and are inexpensive. They cost from nothing to $10 or $15 per 1000 feet of rods more than the conventional uniform grade method, and in many cases cost less by eliminating hold-downs in low places.

It is necessary to know the proper relation between the different factors involved in order to get the maximum benefit and at the same time prevent the rods from jumping out of the bottom of sags. Figure 13 shows a catenary supported at the points **A** and **B** of equal elevation. If P is the pounds pull on rod line, w is pounds per foot weight of rods, $2x$ is distance between supports **A** and **B**, and y is the amount of sag,

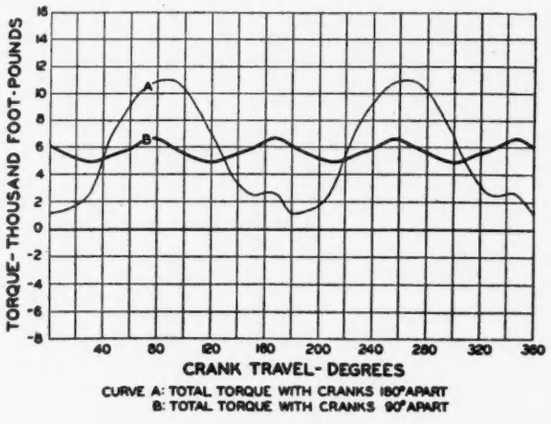

TORQUE - THOUSAND FOOT-POUNDS
CRANK TRAVEL - DEGREES
CURVE A: TOTAL TORQUE WITH CRANKS 180° APART
B: TOTAL TORQUE WITH CRANKS 90° APART

FIGURE 11

Shaft Torque—Four Wells

then $wx^2=2Py$. (This parabolic formula so closely approximates the true catenary, that the error is negligible when the sag is less than 10 percent of the span.) Level supports represent a condition seldom encountered in actual practice, but hereinafter are several formulas of practical value derived from the above basic formula.

This system of sagging rod lines is especially adaptable in areas of rolling terrain, as many hold-downs and high rod-line stakes might be eliminated if maximum allowable sag is known.

To clarify the relation between the above formula and friction reduction, a specific case of a well pumping with 2000 feet of ¾-inch pull rods (1.6 pounds per foot) laid in the conventional manner will be considered. The

—Cut Figure 13—

dynamometer chart on this well shows a maximum of 7600 pounds average up-stroke weight of 6090 pounds, and average down-stroke weight of 2117 pounds, or a mean effective weight of 3973 pounds. Horsepower is 2.6 at 14.4 18-inch strokes per minute. If coefficient of friction is 0.3, the loss due to friction is $0.3\times2000\times1.6=960$ pounds on each half of the stroke.

If sags are installed in this line supported on hold-ups 5 feet high, from the basic formula $x^2=\frac{2Py}{w}=\frac{2\times8500\times5}{1.6}$, from which x=230 feet or 2×(distance

Shoot with

DU PONT 60% HI-VELOCITY GELATIN...

FOR MAXIMUM EFFICIENCY

60% Hi-Velocity Gelatin includes a patented feature and is made only by du Pont. It was developed originally for submarine blasting and was only recently introduced for geophysical prospecting. It detonates at maximum velocity under all conditions of pressure, confinement, length of submersion or head of water met in the field. This quality makes 60% Hi-Velocity Gelatin particularly valuable when firing in deep holes under high pressure.

Modern geophysical prospectors are standardizing their shots with 60% Hi-Velocity Gelatin, because it gives them the uniform performance their work demands.

Its slightly higher price is more than offset by its dependability.

E. I. DU PONT DE NEMOURS & CO., INC.
EXPLOSIVES DEPARTMENT, WILMINGTON, DELAWARE

BRANCH OFFICES:
Birmingham, Ala.; Chicago, Ill.; Denver, Colo.; Joplin, Mo.

DU PONT
REG. U. S. PAT. OFF.

SEISMOGRAPH EXPLOSIVES

DU PONT ON THE AIR—*Listen to "The Cavalcade of America" every Wednesday evening, 8 p. m., E. D. S. T., over CBS coast-to-coast network*

between hold-ups)=460 feet. Although the maximum weight of the well is only 7600 pounds, P is assumed as 8500 pounds, because it is good practice to increase the maximum load 10 to 15 percent to provide for additional weight that might be caused by tight plunger fit, greater jack ratio, etc. Where there may be a paraffin condition, the maximum weight should be increased as much as 60 to 70 percent in some cases to provide for additional weight due to paraffin accumulation in tubing. For instance, a 3200-foot well at Pampa using 2½-inch pumping equipment weighed 14,500 pounds maximum. After tubing was pulled and paraffin steamed out, it weighed 9200 pounds maximum.

FIGURE 12
Sagging Rod Line

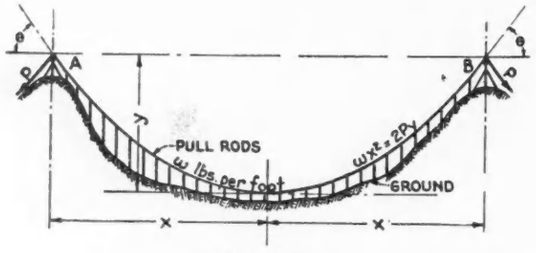


FIGURE 13
Exaggerated Profile of Pull Rod Line

On the up-stroke when average weight is 6090 $w=\frac{2Py}{x^2}=\frac{2\times6090+5}{230^2}=1.15$ pounds per foot of rods relieved from doll heads, which represents a saving of $1.15\times2000\times0.3=690$ pounds average. On the down-stroke $w=\frac{2\times2117\times5}{230^2}=0.4$ pounds per foot not carried by doll heads, a saving in friction of $0.4\times2000\times0.3=240$ pounds; or a total saving of 930 pounds in a complete revolution. This represents a reduction in horsepower of 0.61, or 23 percent.

We have two adjacent leases in Wichita County, each of which was pumped from its own central bandwheel power, rod lines being in the conventional manner. These powers were dismantled, and a new one built in a central location to handle both leases (23 1800-foot wells) with rod lines constructed in series of sags. Hold-ups were not spaced as closely together as possible for maximum benefit because of topography and existing roads. Dynamometer charts were made of all wells before and after the new installation. Although 32 percent more rods were used, an average reduction of 19½ percent in horsepower was effected. Part of this was due to the bad condition of the original rod lines. Similar reductions have been measured in other installations.

Hold-ups

Figure 14 illustrates a type of hold-up now being used on more than 100 of our wells. Several are being used on 3200-foot wells, and some have been in use for as long as 4 years. A few failures have occurred due to faulty welding of the box, but none due to wear. This hold-up consists of a shop-made welded angle-iron box, attached to a 2-inch pipe stake by means of a sleeve clamp, and a pipe nipple roller to carry the pull rod. The box should be strongly welded to prevent damage by rod-line vibration. The cost is about $10 complete, including pipe stake with welded braces, concrete, and labor for setting. The only attention required is the application of a little grease occasionally at the point where the rod contacts the roller to permit slippage when the roller bumps the end of the box. Otherwise the roller might be forced over the end of the box and dropped to the ground. Grease is not desirable in the box.

It was at first feared that bending of rod over roller hold-ups would quickly fatigue and break them, but such has not been the case. Our only explanation is this: The rod does not make a sharp bend over the roller, but a gradual arc. To form this permanent arc, the rod must pass its yield point; and the stress set up in excess of the yield point in a ductile material establishes a new yield point approximately equal to the stress set up.[1] This prevents flexing beyond the elastic limit after the permanent arc has been formed; hence fatigue does not result.

Too great a vertical angle over the roller must not be used if the above is to hold true. Our experience indicates that for a 3200-foot well weighing about 10,000

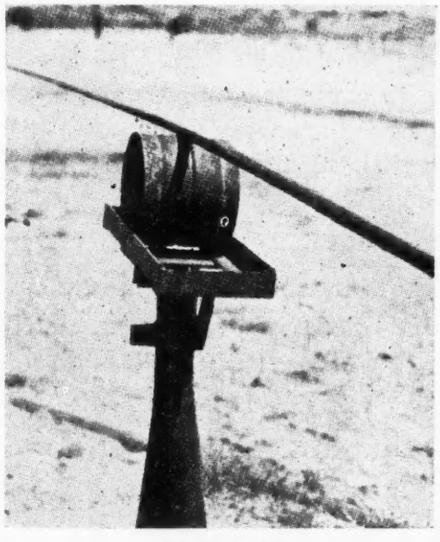


FIGURE 14
Roller Hold-Up

LONG LIFE...*SMOOTH OPERATION*

Modern engineering design has speeded up every character of transport—by rail or highway—in the air or on the water.

Maintenance is the problem that follows this increase in mechanical tempo . . . and proper lubrication is the answer.

Lube oils must be kept clean and effective—after they go into actual use. The Purolator Oil Filter does that job. It removes the dust and grit and fine metal particles and hard carbon that are the enemies of good lubrication. Keeps these abrasive substances from invading that fine film of oil that separates and protects close moving parts.

The Purolator Oil Filter is acknowledged as a definite contribution to maintenance economy.

Its usefulness is even felt along the routes of the great pipe lines that take the crude oil from the fields to the refineries. Booster Stations equipped with Diesel engines draw their fuel supply from the crude oil while enroute and Purolator Filters, in double series, with .0025 and .0015 spacings, remove the basic contamination, thereby rendering it available as a constant, economical supply of Diesel Fuel.

Purolator engineers solicit your inquiries for filtration service in Booster Station operation, and are prepared to discuss any problem of this nature. Motor Improvements, Inc., Newark, N. J., makers of

PUROLATOR

The Oil Filter

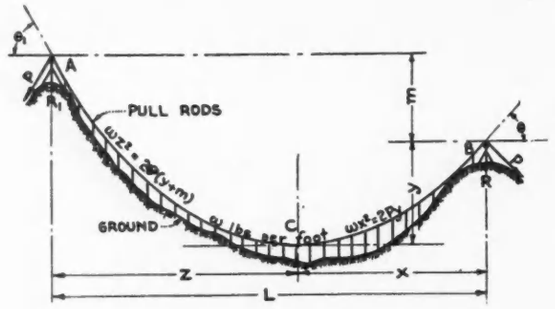


FIGURE 15
Exaggerated Profile of Pull Rod Line

pounds maximum, a vertical angle greater than 5 degrees to 6 degrees should not be used. For wells 2000 feet deep and less, weighing 4000 pounds to 7000 pounds, angles up to 7 degrees or 8 degrees may be safely used. The angle of rods with the horizontal (θ in Figure 13) is an angle whose tangent is $\frac{2y}{x}$. If the sag to the left of point **A** is the same as that to the right, the angle of bend of rods is 2θ.

Design and Installation

Although each rod line presents a different problem because of topography and other factors, computations are simple—and an engineer with one helper can plan several in one day. Although a profile of the ground is not essential, it is helpful, and is recommended until one becomes familiar with the method.

In construction, hold-ups should be set first and a wire stretched between them with sufficient tension so that it will sag to the predetermined elevation between hold-ups, as a guide for driving rod-line stakes. Allowance of about 3 inches should be made for doll heads.

Conclusion

Life of the equipment in back-side hook-ups and rod lines will depend to a great extent on accuracy of alignment and careful attention to details in the original installation; on proper balancing of loads on the unit; reduction of friction as much as possible; and occasional inspection to see that alignment is maintained. It will depend largely, also, upon adherence to the old adage that "no chain is stronger than its weakest link." Breakage of the weak link may seriously damage other parts of the rod-line system; so a very careful inspection should be made of all second-class material to be used to see that it is in good condition.

Formulas

The curve **ABC** in Figure 15 represents a sagging rod line supported by hold-ups at the points **A** and **B** of different elevation. To determine the horizontal position of the bottom of sag and the amount of maximum sag:

$$x = \frac{L^2 - \frac{2Pm}{w}}{2L}$$

Then from the basic formula:

$$y = \frac{wx^2}{2P}, \text{ and } y + m = \frac{wz^2}{2P}$$

where:

L = distance between hold-ups, in feet.
m = difference in elevation of hold-ups, in feet.
w = weight in pounds per foot of pull rods.
P = maximum weight of well on pull rods, in pounds.
x = horizontal distance from bottom of sag to **B**.
z = horizontal distance from bottom of sag to **A**.
y = amount of sag below **B**.
y + m amount of sag below **A**.

The more usual case is where ground between hold-ups is of such elevation that maximum sag cannot be allowed. Then the value of y will be fixed, and the value of w will be unknown. This value of w will be something less than the actual weight of rods used, and will represent that part of their weight lifted from doll heads at the maximum weight of well. In this case:

$$x = \frac{L}{m}\left(\sqrt{y(y+m)} - y\right), \text{ and}$$

from the basic formula

$$w = \frac{2Py}{x^2} = \frac{2P(y+m)}{z^2}.$$

To find the angles θ and θ_1 of rod with horizontal at hold up:

$$\text{Tan } \theta = \frac{2y}{x}, \text{ and Tan } \theta_1 = \frac{2(y+m)}{z}$$

To find load to be carried by hold-up, or *reaction*:

$$R = P \sin \theta, \text{ and } R_1 = P \sin \theta_1$$

These *reactions* are equal to the total weight of rods lifted between bottom of sag and supports, or $R = wx$ and $R_1 = wz$.

The sag on both sides of a hold-up must be considered when it is desired to find the total angle of bend of rod or the total reaction on hold-up.

The GREATEST ADVANCEMENT in DRILLING FLUIDS in years

SULCO LIFE PRESERVERS FOR OIL WELLS PRODUCTS

SILICATED MUDS

PATENT PENDING

Proved for positive, economical results. Puts all other drilling fluids in the shade . . . especially in drilling heaving shale.
SULCO SILICATED MUDS ARE

GELITE **SLUSH-MIX**
HEF-T **PRODUCERS BRAND**

Other SULCO Life Preservers:

MUD-FLUX--Controls Viscosity
FIBERSEAL--Formation Sealer for Mud or Cement
FISSURSEAL--For lost Circulation
KONSET and CEMENTO--For waterproof Cementing
KLEEN-A-WELL and OIL WELL REVIVER--Paraffin Removers

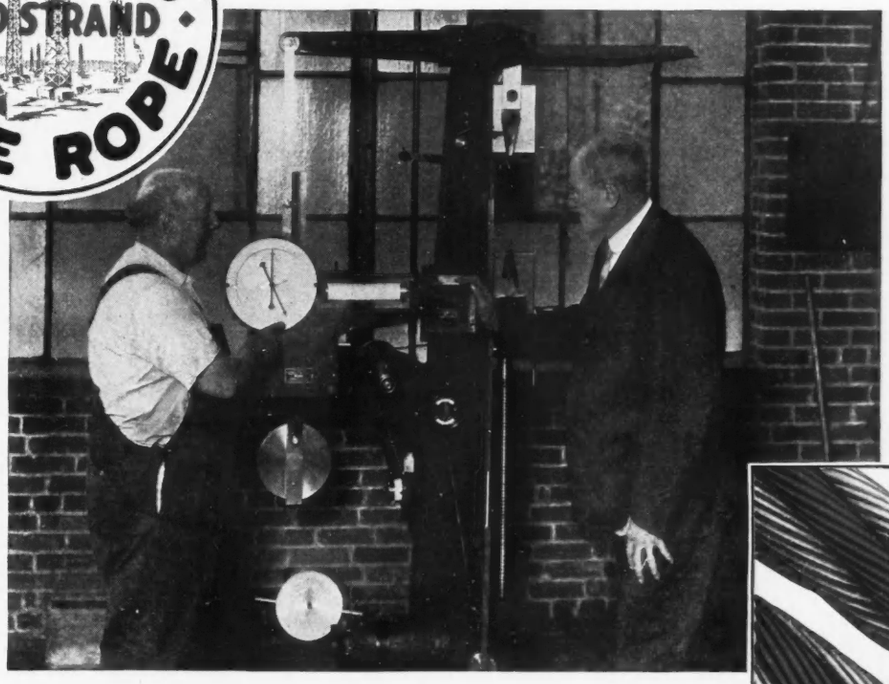
For Sale by Any Supply Store—Or Write for Descriptive Literature and Price Lists

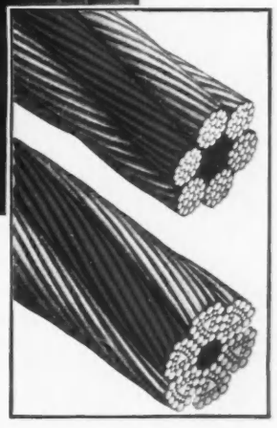
MANUFACTURING TECHNICIANS

THE SULLIVAN CO.

MEMPHIS, TENN.

"HERCULES" REG. U.S. PAT. OFF. RED STRAND WIRE ROPE





The man at the left has been with our company for 60 years, and he is still active. On the right is a man who was in our active service for 49 years, and on our retired list for over 17 years. The long and practical experience of these and similar craftsmen in our organization has been a big factor in developing and maintaining Leschen Quality.

Modern Equipment— Experienced Workmen—

Domestic Distributors:

CASEY & NEWTON
901 Century Building
Pittsburgh, Pa.

GULF HARDWARE & SUPPLY COMPANY
Corpus Christi, Texas

F. HAMILTON CO., INC.
Bradford, Pa.

HERCULES SUPPLY COMPANY
Fort Worth, Texas

HILLMAN-KELLEY, INCORPORATED
2441 Hunter Street
Los Angeles, Calif.

HINDERLITER TOOL COMPANY
Tulsa, Oklahoma

NORVELL-WILDER SUPPLY COMPANY
Beaumont, Texas

OSBORN MACHINERY COMPANY, INC.
Clarksburg, W. Va.

PARKERSBURG SUPPLY COMPANY
Parkersburg, W. Va.

STRAKER & TROUT
Mount Pleasant, Mich.

UNION PIPE & SUPPLY COMPANY, INC.
Owensboro, Kentucky

UNITED PIPE & SUPPLY CORPORATION
Charleston, W. Va.; Paintsville, Ky.

Export Distributor:

CONTINENTAL EMSCO COMPANY, INC.
No. 30 Rockefeller Plaza, New York, N. Y.
Branches: Buenos Aires - London - Ploesti

THIS IS ANOTHER VITAL COMBINATION in the manufacture of Leschen Wire Lines. While we set a high value on experienced workmen, we do not underestimate the importance of modern methods and equipment.

High quality and consistant service are never matters of chance, and the unusual durability of "HERCULES" (Red-Strand) Wire Lines is no exception. Just as you look for the Karat on gold and Sterling on silver, look for the Red-Strand on wire rope. It is your assurance that you are getting Leschen Quality.

If you believe that your wire lines should be designed and manufactured by men who know wire lines, your choice should be "HERCULES" (Red-Strand), for it is founded on 79 years of rope-making experience.

A. Leschen & Sons Rope Co.

Established 1857

5909 KENNERLY AVENUE, ST. LOUIS, MO.

New York Chicago Denver San Francisco

APPLICATION OF

Multi-Cylinder Gas Engines

By D. G. KINGMAN,
General Petroleum Corporation of California,
Los Angeles, California

THE author discusses briefly the operating characteristics and selection of gas engines for pumping—emphasizing the need for uniformity in obtaining and recording manufacturers' performance data, using the brake mean effective pressure, with a discussion of the use of vacuum gage and tachometer in making "manifold-depression" tests in the field. Cost and maintenance data are included.

The statements and opinions expressed herein are those of the author, and should not be construed as an official action or opinion of the Institute or of this publication.

This paper was presented at the spring meeting of the California District, Division of Production, of the American Petroleum Institute, at Los Angeles, April 14, 1936, and held over for re-presentation at the Sixth Mid-Year Meeting, Tulsa, May 14, 1936.

WHILE multi-cylinder engines have long been used as a source of industrial power, they have only recently been used in the production of oil. This use is increasing, and it has in general been successful, largely because of an increasing conception on the part of the operators of the problems involved in the application of this type of prime mover and a willingness on the part of the manufacturers to provide engines particularly suited to the conditions encountered.

The application of multi-cylinder gas engines cannot be undertaken as a general policy applicable to all conditions, as in many instances the use of gas engines is not economically justified. Every case must be considered by itself, and all the influencing factors given careful consideration, before deciding upon the type of motive power to employ.

Selecting Engine

The first problem which confronts the operator in the application of gas engines is that of suiting the engine to the job. This means, on the one hand, that the operator does not want to use an engine which is too small for the job, as maintenance and repair costs will be high; while, on the other hand, he does not want to use an excessively large engine, as he is penalizing himself with an unnecessarily high initial investment. The solution to the problem is to use the engine whose total cost of maintenance, plus depreciation, is the lowest.

In order to select the proper engine, it is first necessary to know the power required. In the case of producing wells this can usually be secured from the prime mover employed. For new wells the power requirements can be ascertained by using a portable pumping unit before installing the permanent unit. When this is impossible, experience with other wells may prove of assistance. When nothing is known as to the potential of the well and a portable unit is not available, it is probably advisable to install an engine which will be more than ample with the hope of replacing it later with one more nearly suited to the job.

Rating Engine

Because of the lack of uniformity of test conditions and differences in engine design, performance curves of gas engines are not usually applicable in the selection of an engine for oil field service. Satisfactory ratings which will result in long life and low maintenance costs can be secured by rating engines upon the basis of a uniform brake mean effective pressure (b.m.e.p.[1]) and piston speed. The values to be used depend upon the service to which the engine will be subjected. For steady loads such as centrifugal pumps or compressors, b.m.e.p. as high as 65 or 70 pounds per square inch has proved

[1] Brake mean effective pressure is used instead of mean effective pressure; for it is necessary to consider the power used by the fan and other accessories at various engine speeds.

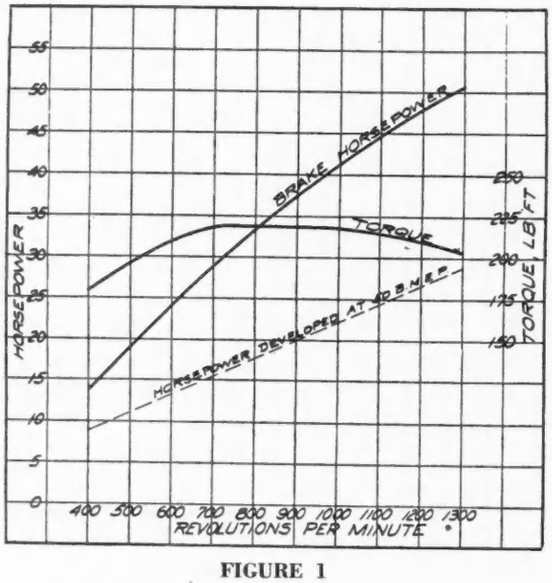
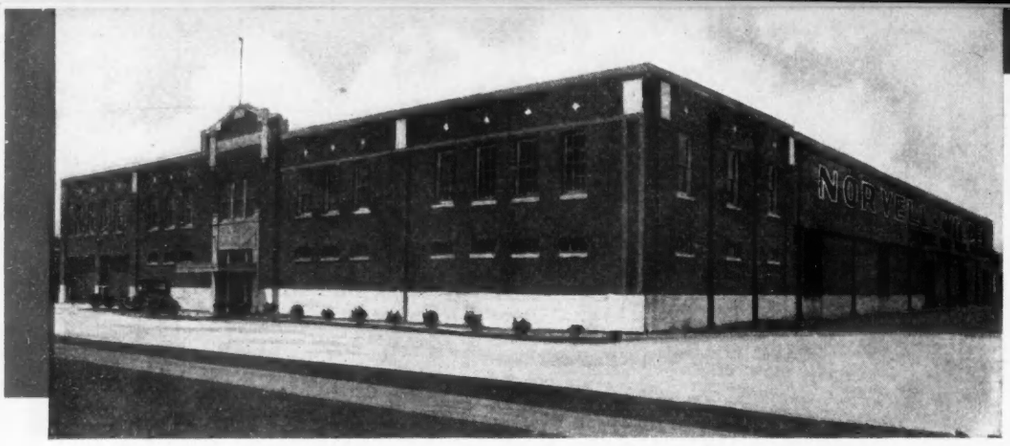


FIGURE 1

4-cylinder. 4½-in. bore. 5½-in. stroke. Performance Curves, Multi-cylinder Gas Engine

New as the DAWN!
THE EASTMAN INSIDE SINGLE SHOT!
Designed to run inside of Drill Pipe where Wire Line core barrels are used. It can also be run with non-magnetic sub and a go devil.
Outside diameter of water tight container 1¾".
Outside diameter of the instrument 1½".
Eastman
OIL WELL SURVEY CO.
Houston, Texas
Long Beach, Calif.
Oklahoma City, Okla.
CONTROLLED DIRECTIONAL DRILLING
Eastman
OIL WELL SURVEY SERVICE



NORVELL-WILDER WAREHOUSE AT BEAUMONT where Spindletop startled the oil world and where new, potential mighty oil fields have just been discovered.

LARGE . . . . NORVELL-

completely

with reliable, dependable,

GIVES YOU QUICK

SAVING YOU

NORVELL-WILDER WAREHOUSE AT FORT WORTH a city long associated with Texas' greatest producing oil fields and convenient to North Texas and Oklahoma operations.

NORVELL-WILDER WAREHOUSE AT SHREVEPORT for years a center of oil activity for many of the best known oil fields. From this warehouse Norvell-Wilder serves North Louisiana and Arkansas.

IN AN EMERGENCY

AN ESTABLISHED CONNECTION

with

NORVELL-WILDER

MAY SAVE YOUR ENTIRE

INVESTMENT IN YOUR WELL

OVER A QUARTER OF A CENTURY OF SPECIALIZED SERVICE TO THE OIL

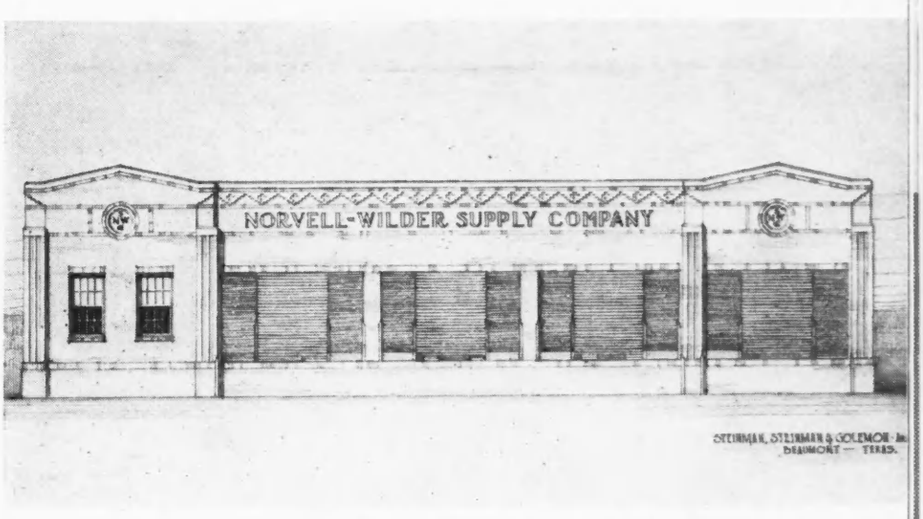
WILDER
WAREHOUSES
stocked

oil industry equipment
DELIVERY
TIME AND MONEY

NORVEL-WILDER WAREHOUSE AT HOUSTON one of the world's greatest oil centers. Great oil fields are nearby, some right at Houston's back door. Converging at Houston's refining area are pipe lines from all parts of the producing territory of the Middle United States, one even from Wyoming.

NORVELL-WILDER WAREHOUSE AT LAKE CHARLES the center of an oil area that has steadily grown in importance. It is the recognized headquarters of oil activities for Southwest Louisiana.

FOR APPRECIATIVE
FRIENDLY SERVICE
. . . DAY OR NIGHT . . .
ALWAYS CALL THE
NORVELL-WILDER MAN
first



NORVELL-WILDER WAREHOUSE AT CORPUS CHRISTI. This large new warehouse now under construction and being rapidly rushed to completion will serve Southwest Texas where 3,000 wells were drilled in 1935.

INDUSTRY

Norvell-Wilder
Supply Company

satisfactory. For pumping wells b.m.e.p. of 45 or 50 pounds per square inch, based upon the average load, is commonly used. For intermittent service such as driving shipping pumps or pulling wells, piston speeds as high as 1200 feet per minute are allowable, while for continuous duty 750 to 1000 feet per minute is more satisfactory. The rating of an engine based upon 50 pounds

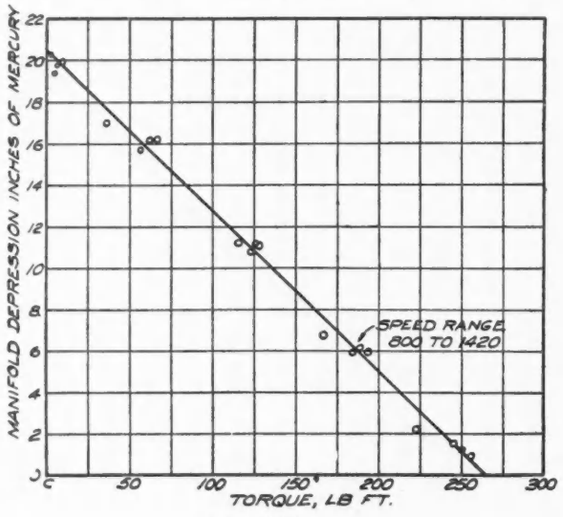


FIGURE 2

6-cylinder. 428 cu. in. displacement. Torque-Manifold Depression Curve, Gas Engine without Fan.

b.m.e.p. and 750 feet per minute piston speed is determined by the formula:

$$\text{Hp.} = \frac{ND^2}{4.47}$$

N = number of cylinders
D = diameter of cylinders, in inches

The speed, in revolutions per minute, to give 750 feet per minute piston speed is determined by:

$$\text{R.p.m} = \frac{4500}{\text{Stroke, in inches}}$$

For 70-pound b.m.e.p. and 1200-foot-per-minute piston speed, the rating of the engine is determined by:

$$\text{Hp.} = \frac{ND^2}{2}$$

Speed is determined by:

$$\text{R.p.m.} = \frac{7200}{\text{Stroke, in inches}}$$

Engine Performance

It is a characteristic of gas-engine performance that the torque increases with the speed to some point, but falls off with further increase of speed. It is held by some that an engine should be operated at a speed equal to, or in excess of, that at which maximum torque is developed. If the load then increases and causes the engine to slow down, there will be more torque available to overcome the resistance—and the engine will continue to operate. If the engine is operated at a speed less than that giving maximum torque, an increase in load causing the engine to slow down makes less torque available; and, unless there is sufficient momentum in the machine being driven, the engine will die. The point of maximum torque generally occurs at engine speeds resulting in a piston speed of about 750 feet per minute. Figure 1 is a typical performance curve for a multi-cylinder gas engine. It illustrates the maximum power that the engine can develop at different speeds, and shows the power developed with a b.m.e.p. of 50 pounds per square inch.

Engine and Job

Details of construction which are desirable are a subject of controversy; but those tending toward simplicity, accessibility, and ease of replacement should in general be favored. The selection of the type of engine depends greatly upon the nature of the job. For intermittent or stand-by service, where the interest on the investment is a large part of the cost of operation, selection of the engine of sufficient size with the lowest first cost is usually indicated—although such choice may mean the sacrifice of features which are otherwise desirable.

For continuous operation, factors tending toward long life should be sought. Such factors include large bearings, low engine speed for a given piston speed, positive lubrication to all moving parts, and ample cooling arrangements.

Torque vs. Manifold Depression

Determination of how much an engine is loaded after it has been installed is a problem. One means of testing which appears to hold promise is the use of a vacuum gauge on the intake manifold of the engine. It has been established by experiment that, for an engine without fan or water pump, torque developed plotted against manifold depression gives a relationship such as in Figure 2.

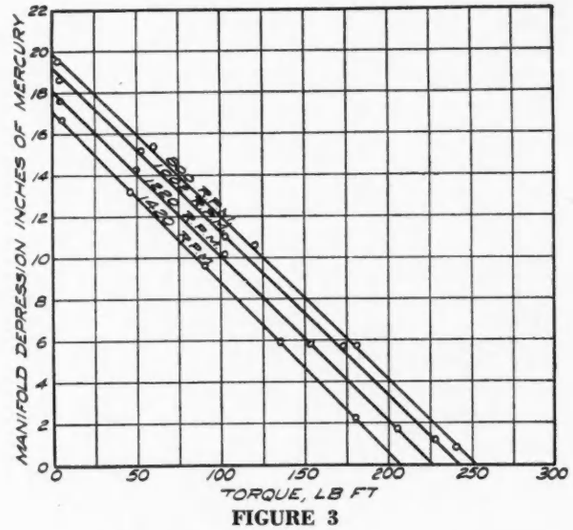
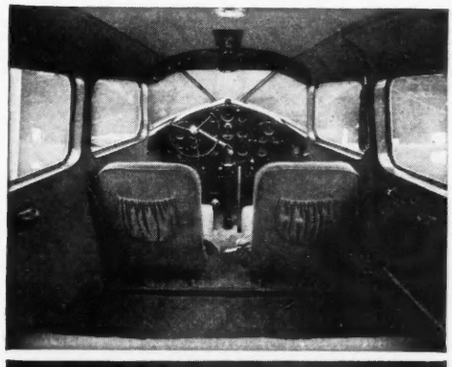


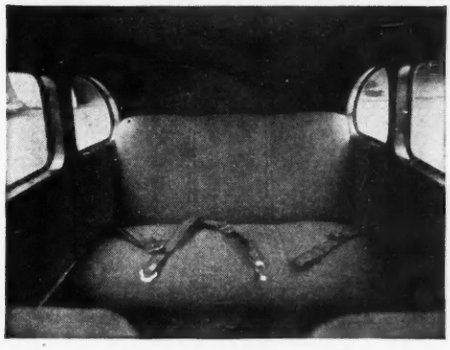
FIGURE 3

6-cylinder. 428 cu. in. displacement. Torque-Manifold Depression Curve, Gas Engine with Fan.

For engines equipped with fan and water pump the relationship tends to be linear, but varies with the speed of the engine (Figure 3).

Technique has been developed for making "manifold-depression" tests of engines in the field. The procedure is to take engine speed with a tachometer, and manifold-depression readings with a vacuum gauge, for different points in the pumping cycle. The V-belts are then removed from the engine sheave, and a torque arm is





—the perfect personal transport

The Fairchild Forty-five, powered with the Wright 320 H.P. engine, was designed expressly for executives who need a fast, comfortable five-place airplane built according to airline standards of design and performance . . . yet having take-off and landing characteristics which permit operation from the most restricted fields. Nearly three-mile-per-minute cruising speed, greater payload and range, exceptional comfort and roominess, and traditional Fairchild construction quality, make this ship the ideal choice for personal transportation of oil industry executives.

Performance with 4000 lbs. Gross Load

(guaranteed within 3%)

Top speed (sea level)	180 m.p.h.
Cruising speed (5250 ft.)	173 m.p.h.
Take-off (with 40° flaps)	580 feet
Rate of climb	1100 ft./m.
Landing speed (with flaps)	49 m.p.h.
Service ceiling	18,000 ft.
Cruising range	4½ to 7½ hours

For full details see Fairchild distributor . . . or write directly to FAIRCHILD AIRCRAFT CORPORATION, Hagerstown, Maryland

FAIRCHILD AIRPLANES · CAMERAS · INSTRUMENTS · AERIAL SURVEYS · RANGER ENGINES

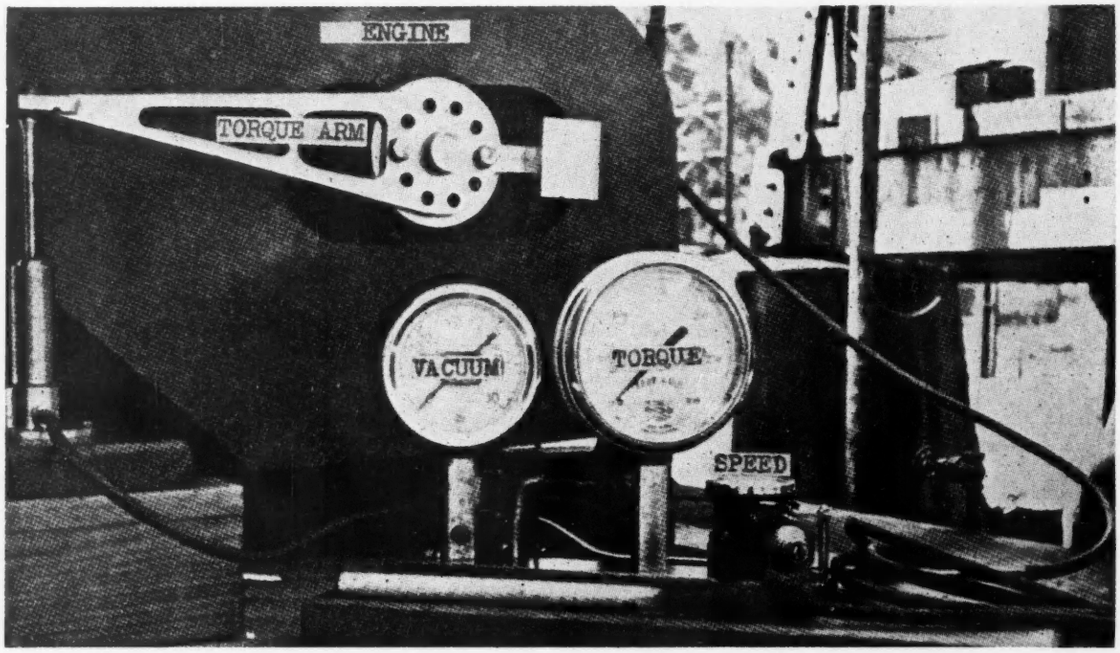


FIGURE 4
Instruments for Determining Speed-Torque Characteristics.

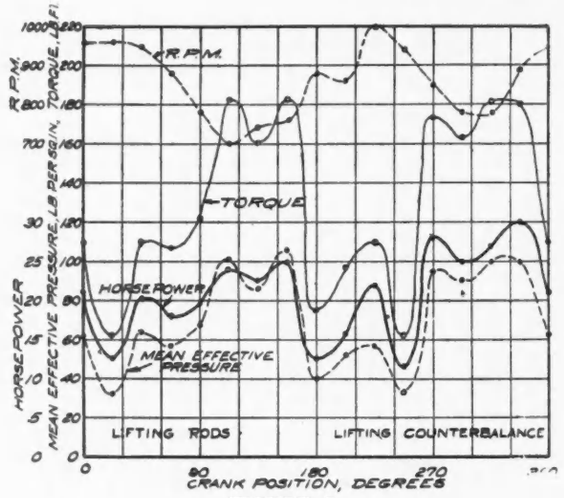


FIGURE 5

4-cylinder. 281 cu. in. displacement, well B-76. Test of Engine at Pumping Well.

clamped to this sheave with its free end resting on scales. Torque is applied to the arm by slipping the clutch of the engine. The speed and manifold-depression conditions previously determined from the engine while pumping the well are reproduced, and the resultant torque observed. From these readings, the torque at different points in the pumping cycle is determined. Figure 4 illustrates the equipment used in making such a test, while Figure 5 depicts the results secured by a test at one well.

Vacuum Gauge

The vacuum gauge has long been used by progressive automotive mechanics as an indication of the condition of an engine. It is believed that it could be used in the same way for multi-cylinder engines in oil field service. Any change in either well or engine condition would be reflected in a change in the manifold depression of the engine, and steps could be taken to investigate and possibly remedy the condition. The vacuum gauge could be permanently attached to the engine housing, where it would be easily seen by the pumper on his rounds. One company has so equipped its engines already in the field, and is specifying that engines purchased in the future come thus equipped.

It is probable that where a considerable proportion of the stress in the pumping equipment and the sucker rods results from acceleration forces, a reduction in stress can be secured through employment of a prime mover with the characteristic of constant torque rather than constant speed. By operating an engine under constant manifold depression, nearly constant torque is developed. Constant manifold depression can be approximated by operation with a fixed throttle setting, or can be more closely attained through use of a regulator actuated by the vacuum in the intake manifold. This regulator is installed between the gas mixer and the manifold. Instances in which this method of operation has been tried have resulted in more uniform torque from the engine than when it was operated on the governor. This may be as much as anything the result of eliminating unsatisfactory governor operation, which in many cases lags so far behind the loading condition of the engine as to accentuate rather than reduce the variations in speed.

When the manifold depression is constant, the amount of this depression supplies a ready indication of the load upon the engine. It is the opinion of operators that, where the manifold depression is greater than about 9 inches of mercury, the engine is not too heavily loaded for continuous operation. Readings in excess of about 13 inches of mercury indicate that the engine could probably be replaced with a smaller one for that particular load.

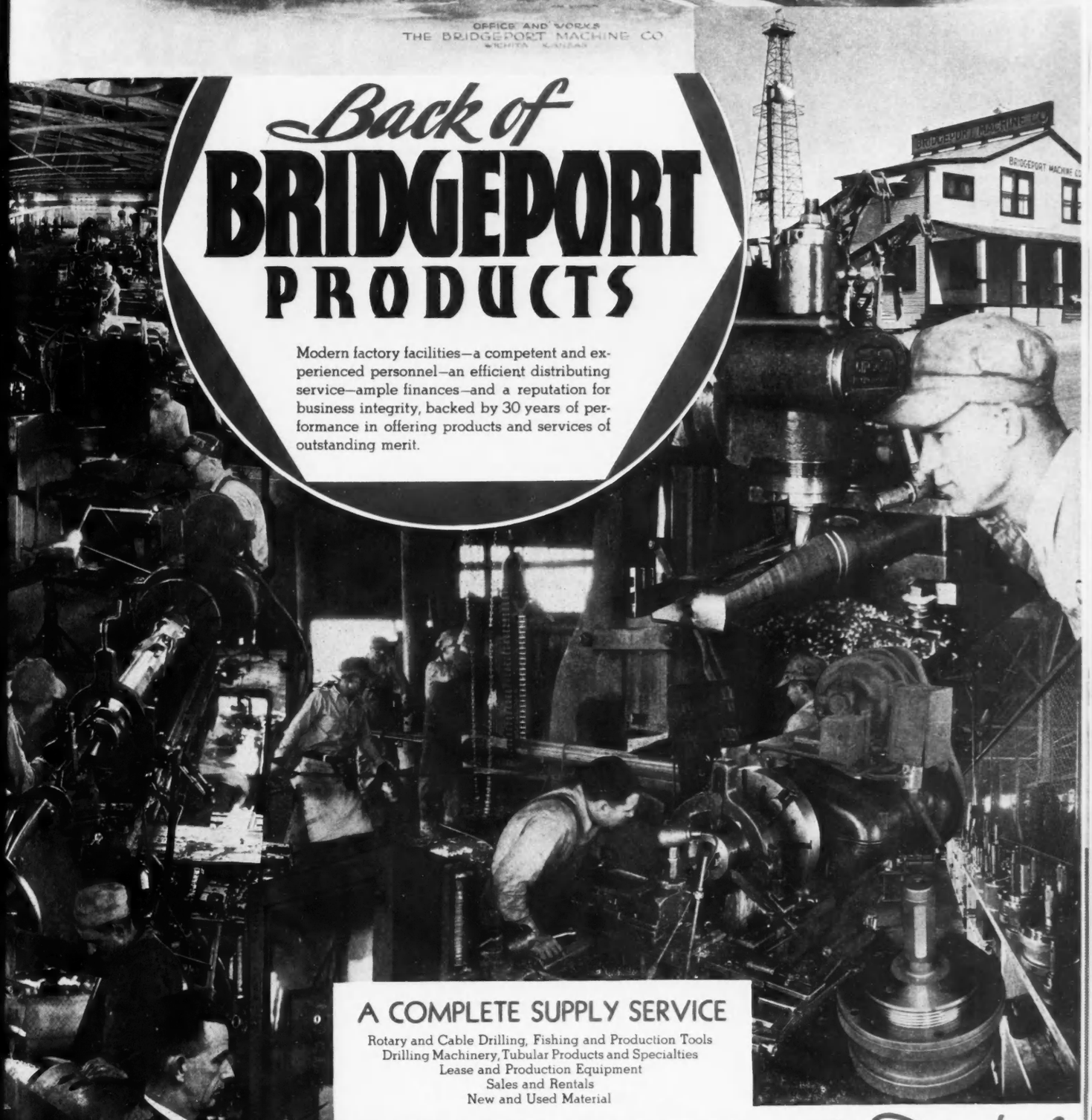
Economics of Gas Engine

The only justification for the use of gas engines as a source of power is that in some cases it is more economical to use them than some competing form of

(*Continued on page 162*)

Back of BRIDGEPORT PRODUCTS

Modern factory facilities—a competent and experienced personnel—an efficient distributing service—ample finances—and a reputation for business integrity, backed by 30 years of performance in offering products and services of outstanding merit.



A COMPLETE SUPPLY SERVICE

Rotary and Cable Drilling, Fishing and Production Tools
Drilling Machinery, Tubular Products and Specialties
Lease and Production Equipment
Sales and Rentals
New and Used Material

BRIDGEPORT
MACHINE COMPANY
MANUFACTURERS DISTRIBUTORS
OIL DRILLING-FISHING AND PRODUCTION EQUIPMENT
GENERAL OFFICE AND WORKS: WICHITA, KANSAS
Eastern and Export Office: 30 Rockefeller Plaza, New York

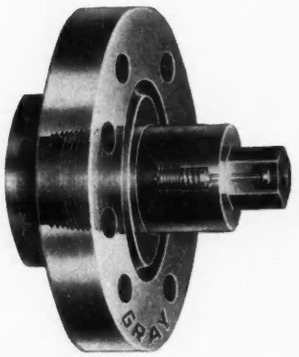
Distributing Branches and Service Offices: Houston, Dallas, San Antonio, Tulsa, Oklahoma City and Wichita. Other Branch Stores and Warehouses in the active Mid-Continent and Gulf Coast oil fields

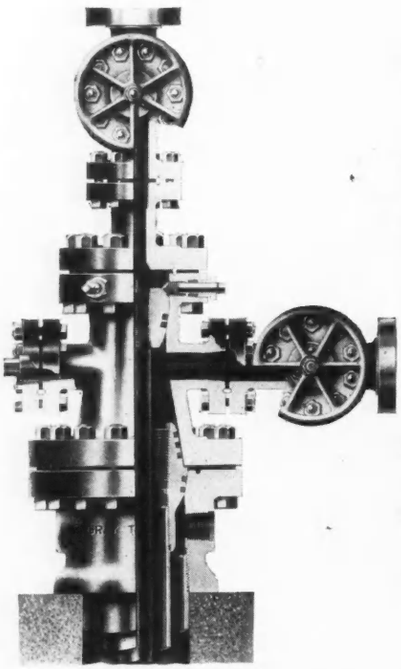
SEE ★★★★ AT THE TULSA OIL★

GRAY valve repair UNDER PRESSURE

CONTROL and FLEXIBILITY PLUS ECONOMY . . . . .

. . . . . at the completion of the well and during its entire life





A. S. A. Tubing Head with All Outlets Arranged for **VALVE REPAIR UNDER PRESSURE.**

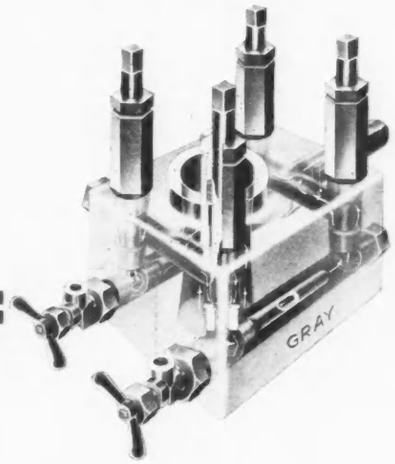
Patented No. 1,701,691
Other Patents Pending.

1. Damaged or leaky valves or fittings may be replaced or repaired without killing the well.
2. Excess parts may be removed and used elsewhere.
3. Corroded working parts may be replaced safely and easily.
4. Obsolete valves or fittings may be replaced by improvements.
5. Increases flexibility of Christmas Tree.
6. Control of well is maintained during entire operation.
7. Simple mechanism—easily operated—used to remove or attach parts to Christmas Tree.
8. All connections may be tested before fitting is removed or after fitting is attached.
9. No undue stresses are imposed on the manifold while the operation is performed.
10. **Entire operation performed under balanced pressure to make operation easier and safer.**

EXPOSITION

GRAY composite manifold CONCENTRATED CONTROL

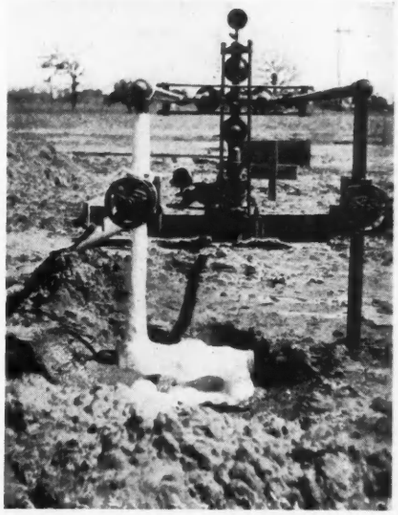
A CHRISTMAS TREE AND . . .



FLOW LINE MANIFOLD ALL IN ONE

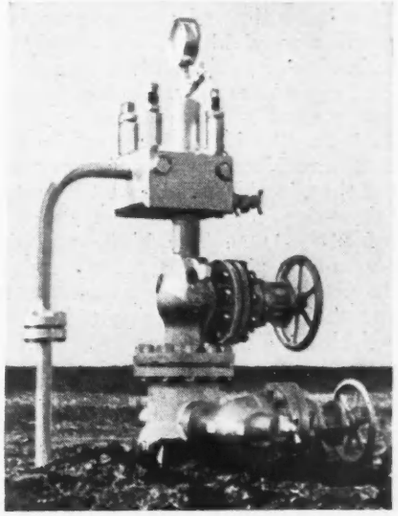
You Benefit From These Advantages and Economies

1. ANOTHER STEP TOWARD REDUCING AREAS AFFECTED BY PRESSURE **resulting in safer and easier operation.**
2. COMPACTNESS . . . **reduces height, resulting in rigidity and freedom from vibration.**
3. REPLACEABLE VALVES AND SEATS **provide for repairs in the field, over the entire flowing life of the well.**



Left—
CONVENTIONAL GRAY CHRISTMAS TREE

Right—
CONCENTRATED CONTROL
With Gray Composite Manifold



PROVEN IN THE FIELD THROUGH USE ON 20 OF THE HIGHER PRESSURE GULF COAST WELLS
We can now state conservatively that the Gray Composite Manifold is ready for general trade acceptance.

GRAY
TOOL COMPANY
HOUSTON — TEXAS

Productivity Index

By M. L. HAIDER, The Carter Oil Company,
Tulsa, Oklahoma

VARIOUS methods of determining the ability of an oil well to produce are discussed. The "productivity index," which is defined as the barrels of oil produced per day per pound differential between static and flowing bottom-hole pressure, is discussed; and methods of determining it are outlined. Data on a number of wells in various pools in Oklahoma are presented. A discussion of the various measures of the relative ability of a well to produce shows the productivity index to be superior. Although it is felt by some that the productivity index is not a constant with rate of production, data presented indicate that if the tests are conducted properly, the productivity index is constant.

Rapid strides have been made the past year or two towards procuring accurate bottom-hole pressure data, and no doubt it will be practical accurately to determine productivity indices and use such indices in allocation of production.

This paper was presented before the Mid-Year Meeting of the Division of Production of the American Petroleum Institute, May 15, 1936, Tulsa, Oklahoma. The statements and opinions expressed are those of the author, and should not be construed as an official action or opinion of the Institute or of this magazine.

THE Topical Committee on Allocation of Production of the American Petroleum Institute has stated that the factors involved in any proration program include productivity, acreage, reservoir pressure, sand thickness, minimum allowable, and volumetric withdrawal. It is not the purpose of this paper to discuss the factors which should be included, nor the weighing of the factors involved, but to discuss productivity. The fact is recognized that, in order to procure equity between the tracts or wells comprising the pool, it is necessary that the several factors be given proper weight in the allocation formula.

Open-Flow Potential

By productivity is meant the relative ability to produce oil. The productivity of a well should be an indication or measure of the producing quality of the strata within the drainage radius of the well. The methods of measuring productivity are many and varied, depending on the section of the country and pool in which the well is located. The method most commonly used in the past has been the open-flow potential through the casing. This method is gradually losing in favor with oil producers, as it has been found that it is inequitable, wasteful, and expensive, and not infrequently quite detrimental to the well and to the pool as a whole. Open-flow tests are not a true indication of the comparative ability of the formation to yield oil, due largely to the wide variance in size of equipment, such as casing, christmas trees, separators, etc. Under the system using open-flow potentials it behooves every operator to complete his well with as large a hole as possible in order to assure himself of maximum potential. It is estimated that, in the Oklahoma City pool, alone, the use of over-size equipment cost the operators upwards of $10,000,000. The high rate of production during open-flow potentials greatly reduces the bottom-hole pressure, causing premature and uneven water encroachment, which results in lower recovery of oil and higher lifting costs.

Restricted Potential

Due to the many disadvantages of the open-flow potential, the use of a restricted potential is becoming increasingly popular throughout the industry. The restricted potential may be taken through the casing, using a uniform size choke at the casinghead; but more frequently it is taken through uniform size tubing, with or without a surface choke. Where an open flow through the tubing is obtained, the tubing potential may be used without modification, or the relationship may be established between the open-flow and tubing potentials, and the open-flow potential determined indirectly thereafter from the use of the tubing potential. Tubing potentials are certainly desirable over open-flow tests. The chief disadvantage of tubing potentials is that they tend to "level out" the large-capacity wells due to the inability of the large well to demonstrate its full capacity. This is indicated by the fact that a large proportion of the wells shows approximately the same potential, although differences in their flowing pressures indicate that the ability of some to produce is greater or less than others. This objection is particularly applicable to tubing potentials employing a surface choke.

Productivity Index

A method of determining the relative productivity of a well without an open-flow test has been suggested by T. V. Moore.[1] The use of this method involves measurement of the static bottom-hole pressure and the bottom-hole pressure while the well is flowing at various rates of production. This measure of the relative ability of a well to produce is termed its "productivity index," which is defined as the barrels per day produced per pound differential in pressure between static and flowing pressures. The productivity index is a measure of the ability of the

Refresh your memory

from the

1936 COMPOSITE CATALOG

To remember all of the new items of oil country equipment you saw at the International Petroleum Exposition at Tulsa is an impossible task.

However you have at your elbow the 1936 Composite Catalog and by refering to the manufacturer's space, in all probability you will find descriptions of the items you are interested in.

The following firms using space in the 1936 Composite Catalog had displays at Tulsa.

Use the blue post cards to secure additional information.

ALEXANDER ANDERSON, Inc.
ALLIS-CHALMERS MFG. CO. (Motor Div.)
ALLIS-CHALMERS MFG. CO. (Tractor Div.)
ALLSTEEL PRODUCTS MFG. CO.
AMERICAN AIR FILTER CO., Inc.
AMERICAN BRASS CO., THE
AMERICAN BRIDGE CO.
AMERICAN HAMMERED PISTON RING CO.
AMERICAN IRON & MACHINE WORKS CO.
AMERICAN METER CO., Inc.
AMERICAN ROLLER BEARING CO.
AMERICAN SAND-BANUM CO., Inc.
AMERICAN STEEL DERRICK CO.
ARMSTRONG MACHINE WORKS
ARROWHEAD IRON WORKS, Inc.
ATHEY TRUSS WHEEL CO.
AXELSON MFG. CO.
BAASH-ROSS TOOL CO.
BABCOCK & WILCOX TUBE CO.
BAILEY METER CO.
BAKER OIL TOOLS, Inc.
BALDWIN-DUCKWORTH CHAIN CORP.
BAROID SALES CO.
BEAVER PIPE TOOLS, Inc.
BIG FOUR FOUNDRY CO., Inc.
BLACK, SIVALLS & BRYSON, Inc.
BLAW-KNOX CO.
BRAUER MACHINERY & SUPPLY CO.
BRIDGEPORT MACHINE CO.
BRISTOL CO., THE
BRODERICK & BASCOM ROPE CO.
BROWN INSTRUMENT CO.
BUCKEYE TRACTION DITCHER CO., THE
BUDA CO., THE
BUFFALO GASOLENE MOTOR CO.
BYRON JACKSON CO.
CAMERON IRON WORKS
CHAIN BELT CO.
CHAPLIN-FULTON MFG. CO, THE
CHICAGO BRIDGE & IRON WORKS
CHICAGO PNEUMATIC TOOL CO.
CHIKSAN OIL TOOL CO., Ltd.
CLARK BROS. CO.
CLIMAX ENGINEERING CO.
COFFING HOIST CO.
COOPER, FRED E.
COOPER-BESSEMER CORP., THE
CRANE CO.
CROSBY STEAM GAGE AND VALVE CO.
DARLING VALVE & MANUFACTURING CO.
D & B PUMP & SUPPLY CO.
DAYTON RUBBER MFG. CO.
DODGE MFG. CORP.
DRIFTMETER, Inc.
DUFF-NORTON MFG. CO., THE
DURAMETALLIC CORP.
EASTMAN OIL WELL SURVEY CO.
E. I. du PONT de NEMOURS & CO.
ELASTIC STOP NUT CORP.
ELLIOTT CO.
EMSCO DERRICK & EQUIPMENT CO.
EVERLASTING VALVE CO.
FAILING SUPPLY CO., GEO. E.
FAIRBANKS, MORSE & CO.
FISHER GOVERNOR CO.
FOOTE BROS. GEAR & MACHINE CO.
FOSTER WHEELER CORP.
FOUR WHEEL DRIVE AUTO CO.
FOXBORO CO., THE
FRANCE PACKING CO.
FRANKS MFG. CO.
GARDNER-DENVER CO.
GARLOCK PACKING CO., THE
GASO PUMP & BURNER MFG. CO.
GAS POWER-INCORPORATED
GEARENCH MFG. CO.
GENERAL ELECTRIC CO.
GOODYEAR TIRE & RUBBER CO.
GREEN FIRE BRICK CO., A. P.
GUIBERSON CORP., THE
GULF PUBLISHING CO.
GUSTIN-BACON MFG. CO.
HALLIBURTON OIL WELL CEMENTING CO.
HANCOCK VALVE DIV. CONSOLIDATED ASHCROFT HANCOCK CO.
HANLON-WATERS, Inc.
HARNISCHFEGER SALES CORP.
HAYNES-STELLITE CO.
HERCULES MOTORS CORP.
HERCULES TOOL COMPANY
HEWITT RUBBER CORP.
HINDERLITER TOOL CO.
HUGHES TOOL CO.
HYATT ROLLER BEARING CO.
HYDRIL CO.
INGERSOLL-RAND COMPANY
INTERNATIONAL DERRICK & EQUIPMENT CO.
INTERNATIONAL HARVESTER CO. OF AMERICA
JENKINS BROS.
JENSEN BROS. MFG. CO.
JOHNS-MANVILLE SALES CORP.
JOHNSTON & JENNINGS CO., THE
JONES & LAUGHLIN STEEL CORP.
KEROTEST MFG. CO.
LANE-WELLS CO., THE
LARKIN PACKER CO.
LEEDS & NORTHRUP CO.
LESCHEN & SONS ROPE CO., A.
LINCOLN ELECTRIC CO.
LINDE AIR PRODUCTS CO.
LINEAR PACKING & RUBBER CO.
LINK-BELT CO.
LUCEY PRODUCTS CORP.
LUFKIN FOUNDRY & MACHINE CO.
LUNKENHEIMER CO., THE
MacCLATCHIE MFG. CO.
McCORD RADIATOR & MFG. CO.
MALONEY TANK MFG. CO.
MANZEL BROTHERS CO.
MARTIN-DECKER CORP.
MERCO CENTRIFUGAL SEPARATOR CO.
MERCO NORDSTROM VALVE CO.
MERIAM COMPANY, THE
MISSION MFG. CO.
MOORE & CO., Inc., LEE C.
MORSE CHAIN CO.
MUSKOGEE IRON WORKS CO.
NATIONAL TANK CO.
NORMA-HOFFMAN BEARINGS CORP.
NORVELL-WILDER SUPPLY CO.
OIL COUNTRY SPECIALTIES MFG. CO.
OIL WEEKLY, THE
OIL WELL IMPROVEMENTS CO., THE
OKLAHOMA ELECTRIC POWER CLUB
PALMER CO., THE
PARKERSBURG RIG & REEL CO.
PETROLEUM ELECTRIC POWER CLUB
PETROLEUM MARKETER, THE
PITTSBURGH EQUITABLE METER CO.
PITTSBURGH STEEL CO.
PORTABLE RIG CO.
PYRENE MFG. CO.
RATIGAN, J. P.
RECTOR WELL EQUIPMENT CO., Inc.
REDA PUMP CO.
REED ROLLER BIT CO.
REFINER AND NATURAL GASOLINE MANUFACTURER
REPUBLIC STEEL CORP.
RIDGE TOOL CO.
ROBINSON PACKER CO.
SCINTILLA MAGNETO CO., Inc.
SHAFFER SPECIALTY CO., THE
SIVYER STEEL CO.
SMITH SEPARATOR CORP.
SONNER BURNER CO.
SPANG AND COMPANY
SPERRY-SUN WELL SURVEYING CO.
STAR DRILLING MACHINE CO., THE
SULLIVAN MACHINERY CO.
TAGLIABUE MFG. CO., C. J.
TAYLOR INSTRUMENT COMPANIES
TEMPLETON, KENLY & CO., Ltd.
THERMOID RUBBER CO.
TITUSVILLE IRON WORKS
TIMKEN ROLLER BEARING CO.
TNEMEC CO., Inc.
TOLEDO PIPE THREADING MACHINE CO.
TWIN DISC CLUTCH COMPANY
TYSON ROLLER BEARING CORP.
UNION WIRE ROPE CORP.
VOGT MACHINE CO., HENRY
W. K. M. CO., Inc.
WALWORTH CO.
WAUKESHA MOTOR CO.
WEBER ENGINE CO.
WEBSTER ENGINEERING CO., THE
WESTERN IRON AND FOUNDRY CO.
WESTERN METAL MFG. CO.
WESTINGHOUSE ELECTRIC & MFG. CO.
WHITLOCK CORDAGE CO.
WICO ELECTRIC CO.
WILLIAMS & CO., J. H.
WILSON MFG. CO.
WORTHINGTON PUMP & MACHINERY CORP.
YOUNG ENGINE CORP.
ZINK BURNER CO., JOHN

The Gulf Publishing Company, Houston, Texas

TABLE 1

Flowing Tests on Wells in the Keokuk Pool, Seminole County, Oklahoma

Sub-surface Pressure (Lbs. per Sq. In.)	Pressure Differential (Lbs. per Sq. In.)	Rate of Oil Production (Barrels per Day)	BARRELS PER DAY		
			Pressure Differential	(Pressure Differential) 1/2	(Pressure Differential) 3/2
WELL A **December 1934**					
1,734	0	....	....	....	.....
1,653	81	252	3.11	28	0.346
1,507	227	516	2.27	34.3	0.152
1,335	399	768	1.93	38.6	0.096
1,190	544	982	1.8	42.1	0.077
1,079	655	1,125	1.72	43.9	0.067
August 1935					
1,609	0	0	....	....	.....
1,576	33	160	4.85	27.8	0.842
1,535	74	253	2.88	29.4	0.336
1,420	189	462	2.44	33.6	0.1775
1,256	353	702	1.99	37.4	0.106
WELL B **December 1934**					
1,714	0	....	....	....	.....
1,583	131	280	2.7	24.5	0.187
1,443	271	508	1.875	30.8	0.114
1,272	442	780	1.76	37.2	0.084
1,196	518	1,125	2.17	49.5	0.096
982	732	1,335	1.83	49.4	0.0675
August 1935					
1,605	0	0	....	....	.....
1,521	84	265	3.16	28.9	0.344
1,381	224	420	1.875	28.2	0.126
1,231	374	720	1.93	37.3	0.100
1,120	485	850	1.76	38.7	0.0795

producing formation to yield oil at the sand face; as it does not take into account the resistance of the flow string, but measures only the resistance of flow through the sand or producing formation. Productivity index is, therefore, the true measure of a well's ability to produce, and its use in an allocation formula would assure equity between wells or tracts. Use of the productivity index would obviate the necessity of competitive production methods by operators and the installation of over-size equipment.

Its Measurement

Although engineers are agreed on the many advantages of the productivity index, much remains to be learned about its actual measurement. There is a question as to whether or not the productivity index, as defined above, is a constant value for a given well at various rates of production. In order that it be a constant, the pressure differential must be a straight-line function of the rate of production according to the equation $y = mx + b$ — with $b = o$, $y =$ sub-surface pressure differential, $x =$ rate of production, and m, the slope of the line, is equal to the productivity index. Stanley Herold[2] indicates that the productivity index defined as the barrels per day per pound pressure differential is not a constant with rate of production. He defines two indices: one for reservoirs in hydraulic and volumetric control, and one for reservoirs in capillary control. For the first, dividing the rate by the square root of the pressure differential should yield a constant index; and for capillary control, dividing the rate by the three halves' power of the pressure differential should yield a constant index. The term "productivity index" as used in this paper means the rate divided by the pressure differential.

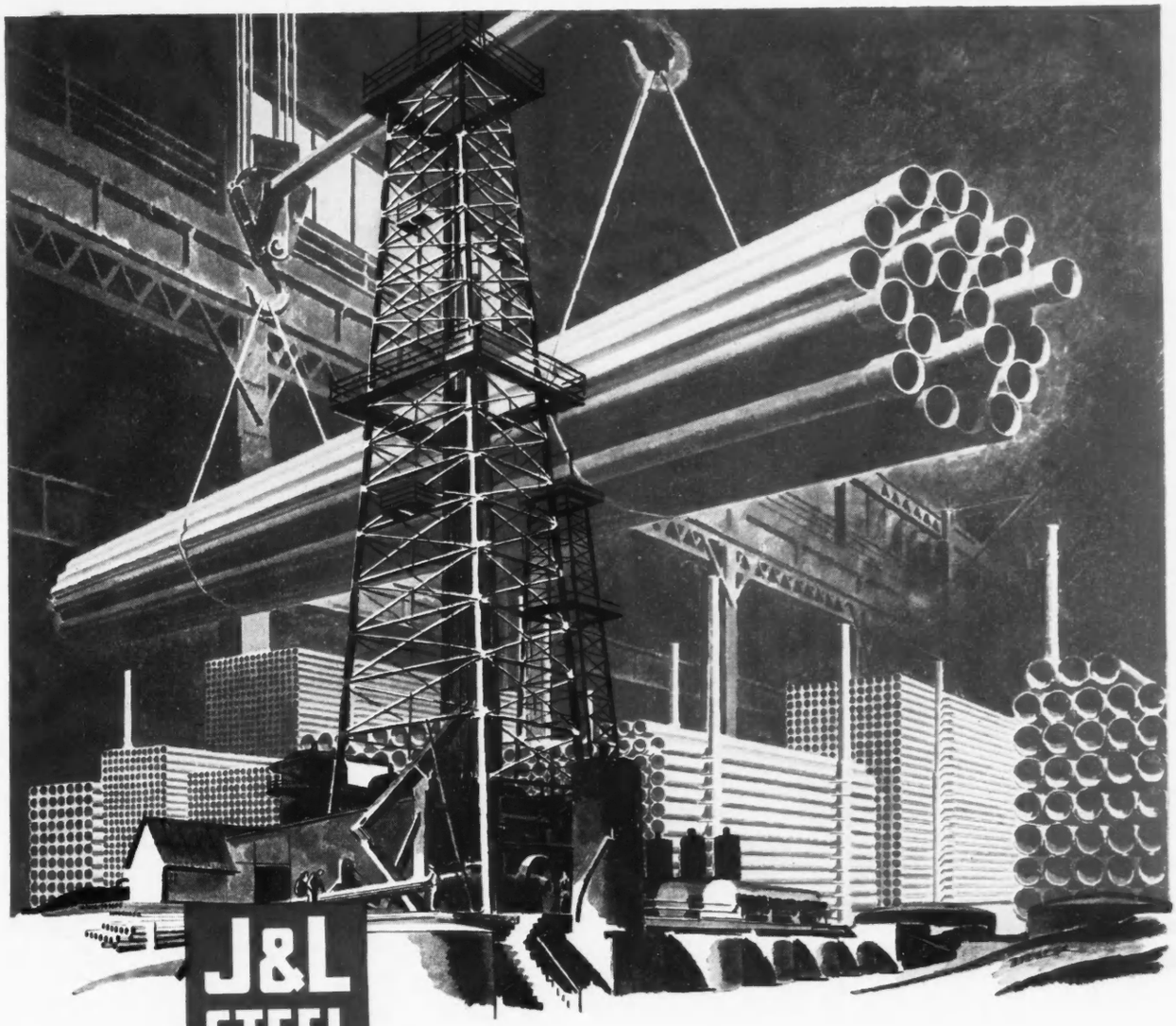
Bottom-Hole Pressure

Although bottom-hole pressure gauges have been in use for a number of years, they have only recently come into rather common usage, and much still must be learned concerning the technique of obtaining accurate bottom-hole pressure data. In determining the static bottom-hole pressure, it is not merely a matter of lowering the gauge into the well and obtaining a reading; it is a question of proper handling of the well prior to the measurement. For example, while one well may attain its maximum bottom-hole pressure after a 4-hour shut-in period, another may require a 24-hour shut-in period; and these factors must be considered in the determination of the static or shut-in pressure. In obtaining the bottom-hole pressure at some rate of production, it is necessary to allow the well to flow at that rate for a sufficient period of time to allow the bottom-hole pressure to become stabilized; this again may require only a few hours in one well, whereas another well may require 10 or 20 hours.

Well Gauging

Another factor which is very important in the determination of the productivity index is an accurate gauge of the well's production. Although the bottom-hole pressure differential plotted against rate of production may be a straight line, this is only true up to a certain percent of the well's potential production —the percent depending on the gas-oil ratio, bottom-hole flowing pressure, and other factors. Assume a well under study which is capable of producing only 400 barrels per day, and the maximum rate at which it could be produced and stay within the straight-line range is 25 percent of its potential. With accurate readings, it would be necessary to obtain only two bottom-hole pressures to establish the productivity index, the static pressure, and the flowing pressure at one rate. However, in order to minimize error, it is advisable to obtain flowing pressures at a number of rates; and it would, therefore, be necessary to produce the well illustrated above at several rates below 100 barrels per day. The rate of 100 barrels per day is equal approximately to 4.2 barrels per hour. If the well is producing into a 500-barrel tank where ¼ inches is equal to 1.36 barrels, it is obvious that considerable error can be made in gauging the well's producing rate.

Table 1 gives data obtained on two wells in the Keokuk pool, in Seminole County, Oklahoma. The data for well A is shown graphically in Figure 1. It will be noted that the pressure differential is decidedly not a straight line. Two sets of data were obtained on each well: one during December 1934, and one during August 1935. Both sets of data are shown in the tabulation and on the graphs. It will be noted that the productivity index, as defined in this



IMPORTANT ALLY OF PETROLEUM

Improved steel products developed by Jones & Laughlin have assisted the Petroleum Industry materially in many of its remarkable accomplishments. J & L seamless drill pipe, casing and tubing are designed to meet the most exacting requirements and are in use in the deepest zone of production, exceeding 10,000 feet. Other important contributions are J & L seamless line pipe, for trouble-free transportation of oil, gas and gasoline, and J & L seamless boiler tubes and still tubes for greater efficiency and economy in the refining process. Jones & Laughlin is now producing light manufacturing terne plate for making tamper-proof oil containers, thus giving further evidence of the manner in which its own developmental work contributes to the progress of this great industry.

* * *

Other J & L products for the petroleum industry include: steel for derricks and other structural purposes; tank barges; and bars, shapes, plates, steel piling, concrete reinforcing bars, wire and nails for maintenance, construction and repairs.

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

J&L PIPE

J&L SEAMLESS
DRILL PIPE · CASING · TUBING · LINE PIPE

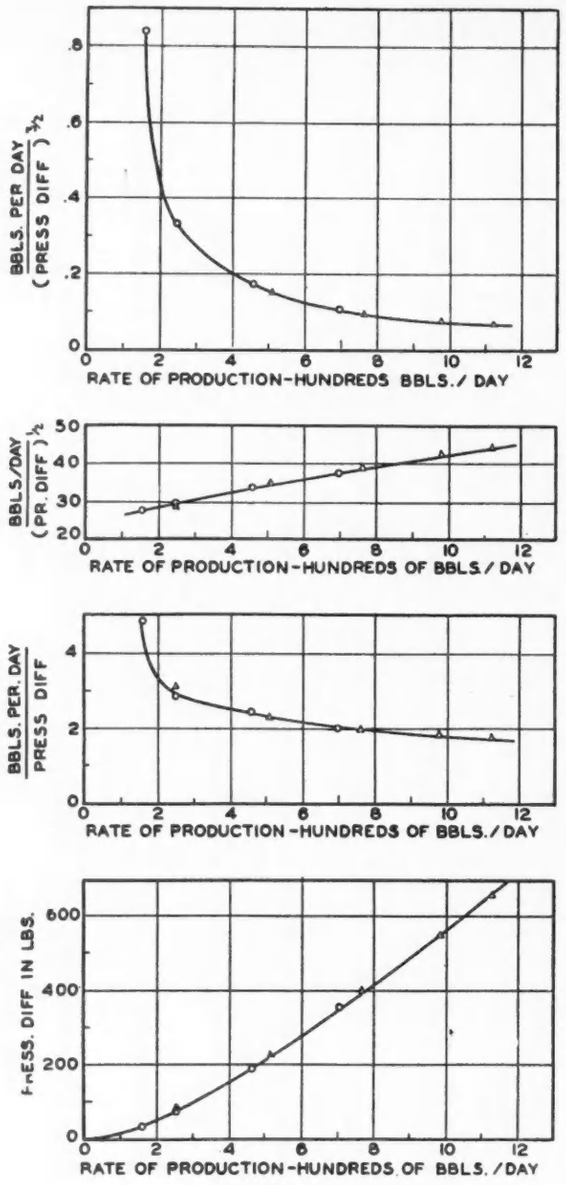

BBLS. PER DAY (PRESS DIFF.)½
RATE OF PRODUCTION-HUNDREDS BBLS./ DAY
BBLS/DAY (PR. DIFF.)½
RATE OF PRODUCTION-HUNDREDS OF BBLS./ DAY
BBLS. PER. DAY PRESS DIFF
RATE OF PRODUCTION-HUNDREDS OF BBLS./DAY
PRESS. DIFF IN LBS.
RATE OF PRODUCTION-HUNDREDS OF BBLS./DAY

FIGURE 1
○—August 1935.
△—December 1935.
Well A.
Keokuk Pool, Seminole County, Okla.

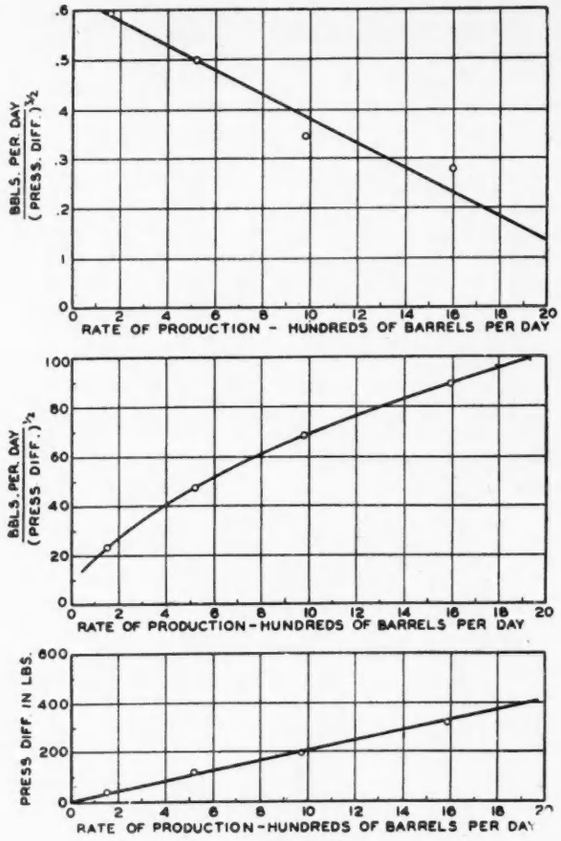

BBLS. PER DAY (PRESS. DIFF.)½
RATE OF PRODUCTION - HUNDREDS OF BARRELS PER DAY
BBLS. PER. DAY (PRESS DIFF.)½
RATE OF PRODUCTION-HUNDREDS OF BARRELS PER DAY
PRESS DIFF IN LBS.
RATE OF PRODUCTION-HUNDREDS OF BARRELS PER DAY

FIGURE 3
Well E.
Lucien Pool, Noble County, Okla.

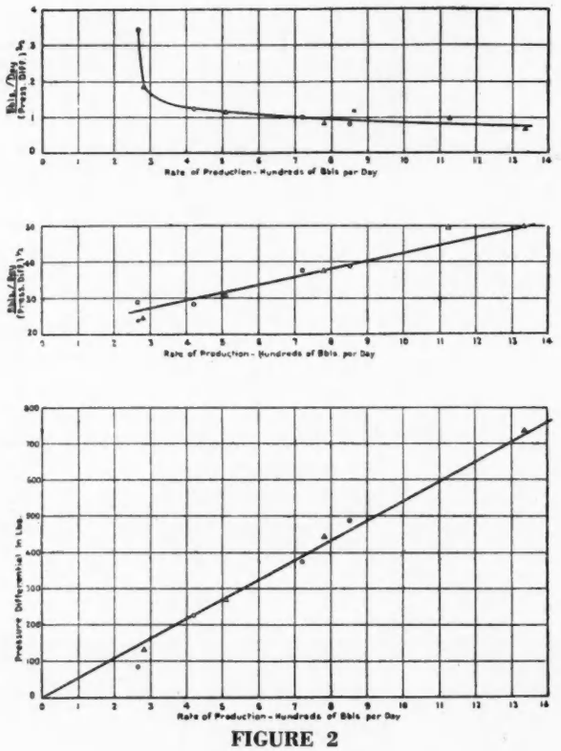

Rate of Production - Hundreds of Bbls per Day
Rate of Production - Hundreds of Bbls per Day
Pressure Differential in Lbs.
Rate of Production - Hundreds of Bbls per Day

FIGURE 2
Well B.
Keokuk Pool, Seminole County, Okla.

paper, is not a constant. However, it will also be noted that the productivity index as defined by Herold is not a constant.

The data for well **B** is shown in Figure 2. Here it will be noted that the relationship between the rate and pressure differential is a straight line passing through the origin, thus giving a constant productivity index with rate of production. Again it will be noted here that the productivity index as defined by Herold is not constant.

Table 2 gives data obtained on three wells in the Lucien pool, Noble County, Oklahoma. The data for well **E** is shown in Figure 3. Here again a straight line can be drawn through the pressure-differential points and the origin, resulting in a constant pro-

[*Continued on page 161*]

Modern Oil Equipment Manufacture

THE
OIL WEEKLY
MAY 18, 1936

Modern
Oil Equipment Manufacture

THE FOLLOWING PAGES provide a pictorial exposition "Behind the Scenes" in modern oil equipment manufacturing plants, showing men, methods and material as combined to produce modern oil field equipment. ¶ Oil Men attending the International Petroleum Exposition will have the opportunity of seeing at first hand all of the latest developments in field equipment and it is the purpose of the following pages to give an insight into some of the modern oil equipment manufacturing plants where these products are developed and distributed.

Above is the entrance to the new, modern Mission plant where the latch string is always out and a welcome awaits Oil Men visiting Houston.

Mission

COME IN FOR A 4 MINUTE TRIP

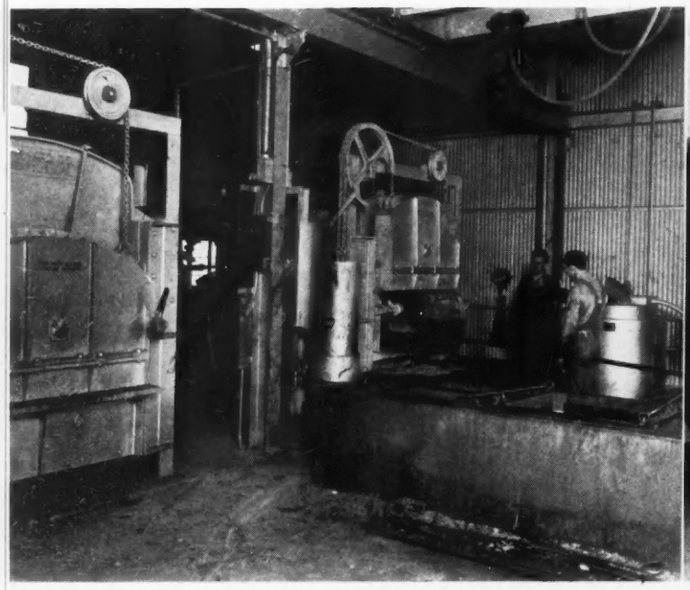
AND SEE HOW MISSION PRODUCTS ARE MADE ..... TO SAVE USERS TIME · MONEY · TROUBLE

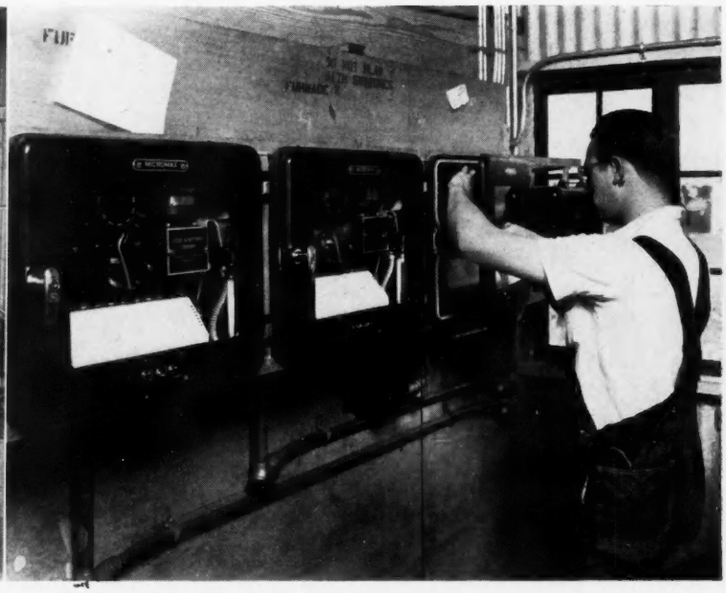
TURN TO THE NEXT THREE PAGES

M I S S I O N

Slips . . . Valves . . . Pistons . . . Swabs . . . LAST LONGER

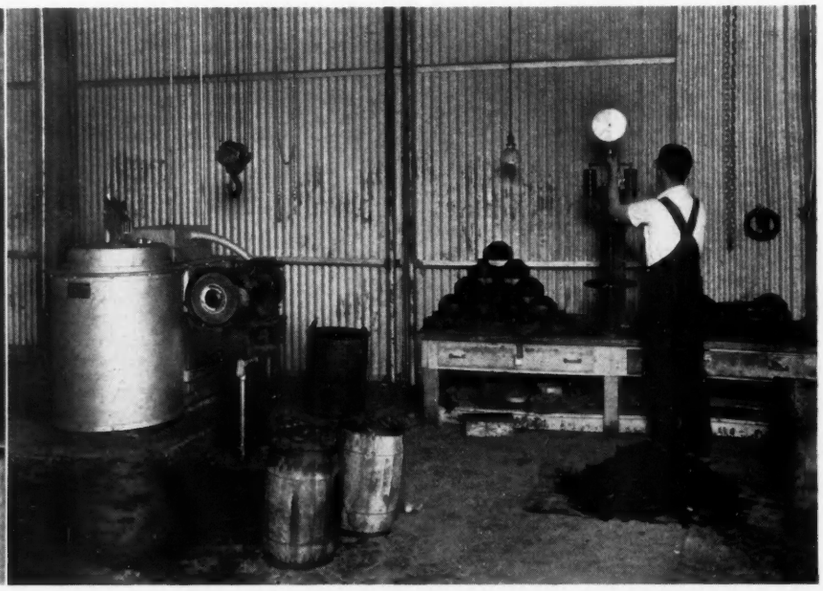
because of painstaking thoroughness in **HEAT TREATING**





Here are two of Mission's Gas Fired Heat Treating Furnaces where forgings are heat-treated under automatic control to maintain the correct temperature at all times. **Tougher, longer-lasting steel results from this carefully controlled heat treating.** Constant 24-hour operation heat-treats an enormous number of slips, valves, pistons, and swabs.

Each of Mission's heat treating furnaces is controlled by electric recording thermocouple pyrometers assuring uniform heat treatment, **a most important step in producing the metals that give Mission products their outstanding reputation for reliability**



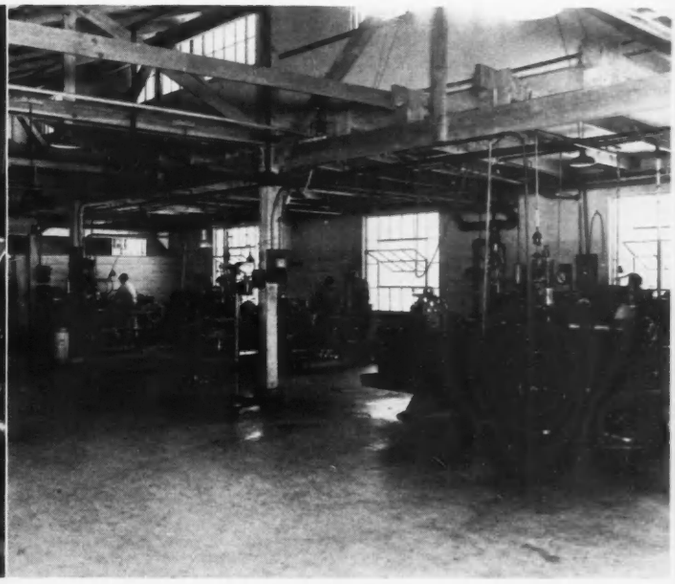
Watch-dogs of precision daily stand guard over the hundreds of operations in the daily routine of Mission precision manufacturing. Valve seats and bushings, slip dogs, and tools are constantly tested for proper hardness with the Rockwell Hardness Tester.

The third process in Mission heat treating is precision drawing in the electric furnace. Costly electric heat treating equipment operated by skilled metallurgists insures accuracy and uniformity. All heat-treated parts 100% inspected with this Brinell hardness testing machine.

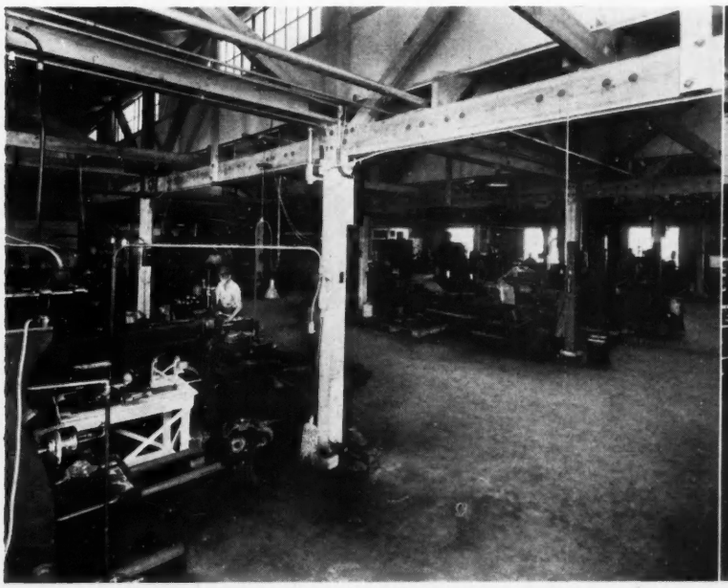
M I S S I O N

Slips . . . Valves . . . Pistons . . . Swabs . . . ALWAYS UNIFORM and DEPENDABLE because of PRECISION MACHINING

Skilled operators and high priced equipment turning out Mission piston bodies machined to extreme accuracy, **guaranteeing trouble-free service in all pumps.** A battery of these turret lathes runs night and day, turning out thousands of units of Mission products



This clean, roomy, well lighted plant with ideal working conditions attracts the most skillful machinists, contributing to more accurate work.



These modern machines are designed and equipped at great expense for specialized work to produce the precision results required for Mission products.

Here is an important section of the Mission Tool Room where precision gauges are finished and maintained. This costly equipment plays an important part in upholding Mission's high standard of accuracy. Mission inspectors take great pride in keeping all Mission products within unusually close tolerances. **Adhering rigidly to such a policy saves users time and money on the lease.**

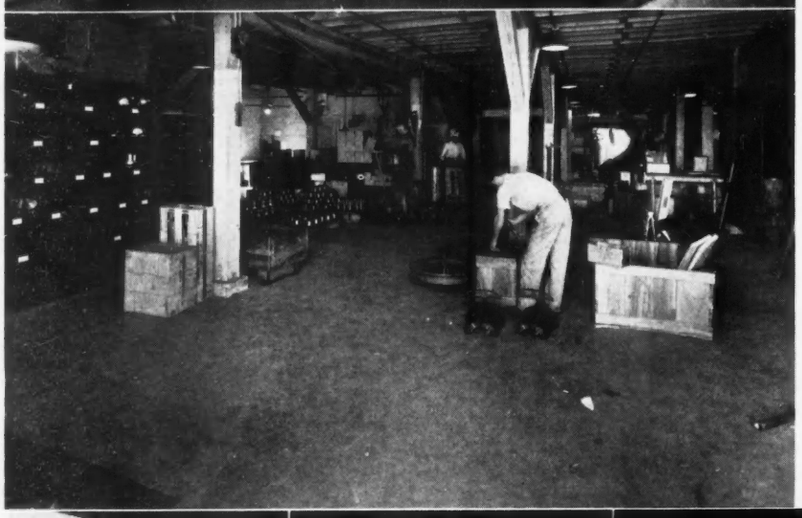
M I S S I O N

Slips...Valves...Pistons...Swabs...REACH YOU IN PERFECT CONDITION
because they are **RIGIDLY INSPECTED** and **CAREFULLY PACKED** for **SHIPPING**

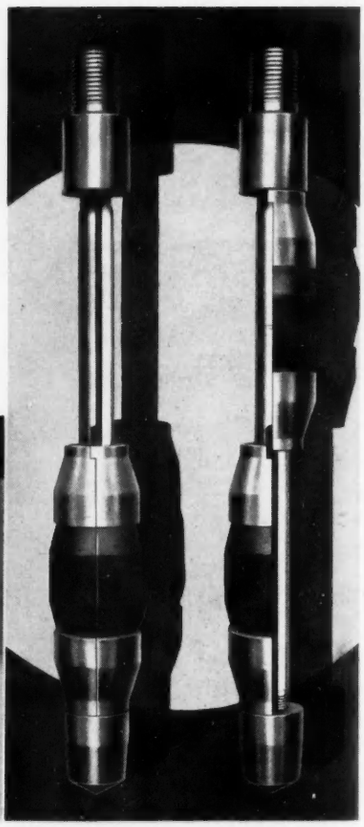
Top left—**These eagle-eyed men are making a final inspection of Mission products** before they go to the shipping department. They are old trained heads who are expert in seeing that no Mission valves, pistons, slips, or swabs go out of the manufacturing department unless they gauge within Mission's exacting limits.

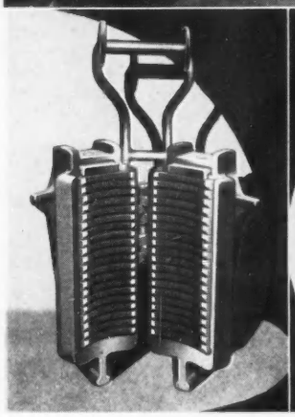
Bottom left—The carton packages in the background contain valves, pistons, and swabs. Mission products are carefully packed in individual containers with sizes and directions printed on the outside. They reach the buyer in perfect condition and always in the sizes ordered—**a convenience that often saves shut-down time.**

In the foreground are Mission slips being packed in strong wire bound boxes for export.

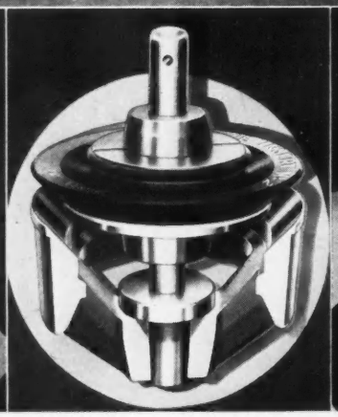


MISSION PRODUCTS ARE USED BY LEADING COMPANIES THE WORLD OVER

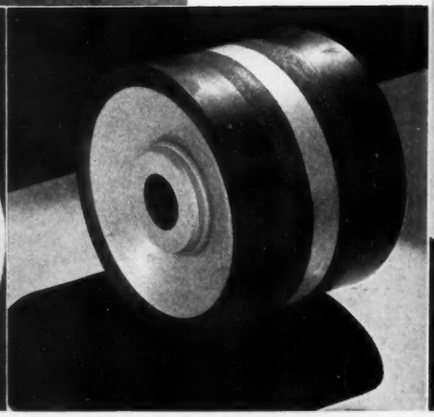




MISSION SLIPS — ROLLING DOG PRINCIPLE brings about immediate release . . . Prevents sticking in bowl . . . saves pipe.



MISSION VALVES LAST 100% LONGER. Seat is a permanent investment. Removable bushings take the pounding. **SAVES MONEY** formerly invested in continuously buying new seats.



MISSION PISTONS CUT UPKEEP COSTS IN HALF. Replaceable rubbers on a permanent body. **SAVES MONEY** formerly invested in continuously buying new bodies.

MISSION SWABS — FASTEST FALLING SWAB ON THE MARKET. SAVES MONEY BECAUSE OF FAST ROUND TRIPS. New, unique, split-rubber principle permits unrestricted, open-flow of fluid.

MISSION MANUFACTURING CO.

HUMBLE ROAD - - - - - - - - - HOUSTON, TEXAS

THE ORIGIN OF THE BOLTED STEEL TANK

THE bolted steel tank industry had its birth almost a quarter of a century ago, in 1912. The youthful oil industry was at that time struggling with many kinds of makeshift equipment, ill-adapted to its requirements. Among its greatest needs was some form of light-weight, quickly and easily erected, and *portable* tankage. The world's first bolted steel tank — the MALONEY knocked-down bolted steel tank here shown — was conceived and produced in answer to that need.

This original tank was manufactured by the Maloney Tank Mfg. Company in November, 1912, and was sold to the Barnsdall Oil Company and erected on one of its Osage leases. The first bolted steel tank was constructed of regular blue-annealed sheet steel. Machine bolts of 60,000 lbs. tensile strength were used. A rubberoid roofing material was used as packing. Ordinary black paint was employed. The tank had loose deck and manhole, an open thief hole, no valve, small clean-out plate. Parts were not interchangeable.

Yet from the very start the Maloney organization was imbued with sound ideals of service, and a few of the earliest MALONEY Tanks are still in use.

Office and Plant of the Maloney Tank Manufacturing Company, Tulsa, Oklahoma

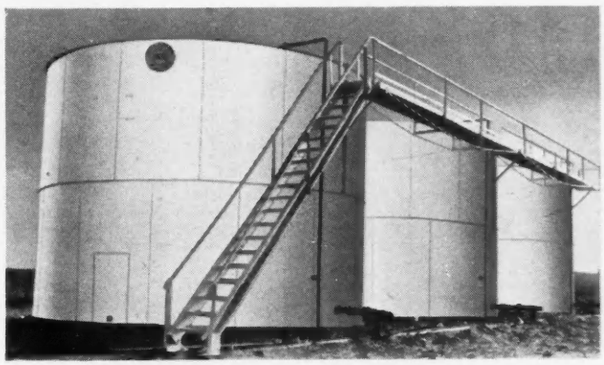
The original bolted steel tank, manufactured by Maloney Tank Mfg. Co., in November, 1912, and sold to the Barnsdall Oil Company

CONTRAST WITH 1936 CONSTRUCTION

The MALONEY Tank of today is the same tank, but every mechanical detail has been perfected under the supervision of expert engineers. Material today is Keystone Copper Steel, proved by exposure tests to possess 200 to 500% greater resistance to corrosion than ordinary steels. Special heat-treated bolts of 90,000 lbs. tensile strength are used. Packing is our special cloth-inserted packing of live red rubber, withstanding a 5-year immersion test in gasoline. Tanks are gas-tight throughout, and all seams and joints have our patented "crimp". Our special large clean-out plate, 30″ x 48″ heavily reinforced, is ideal for its purpose. New segmental deck has rafter supports attached to seams with ½″ bolts on 2″ centers.

MALONEY Tanks are now coated inside and out with our special corrosion-resisting red Chromated Iron Oxide Paint, and outsides then receive heavy finish coat of highest grade aluminum paint. Our large 8″ x 18″ opening aluminum vacuum-pressure valve and thief-hatch is the last word in tank valves.

Cantilever sectional steel walkways and sturdy stairways, adaptable to any requirement, and "hot dip" galvanized MALONEY Tanks for "sour crude" storage, constitute the most recent chapters in the story of Maloney service to the oil industry.



Three modern 1,000-Bbl. MALONEY Tanks and MALONEY self-supporting sectional steel Stairway and Walkway

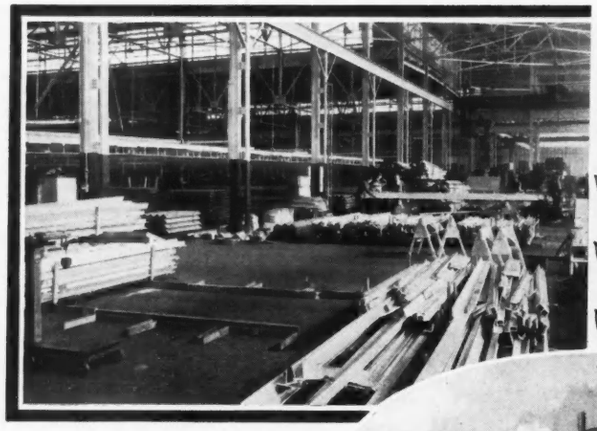
FOUNDED AN INDUSTRY

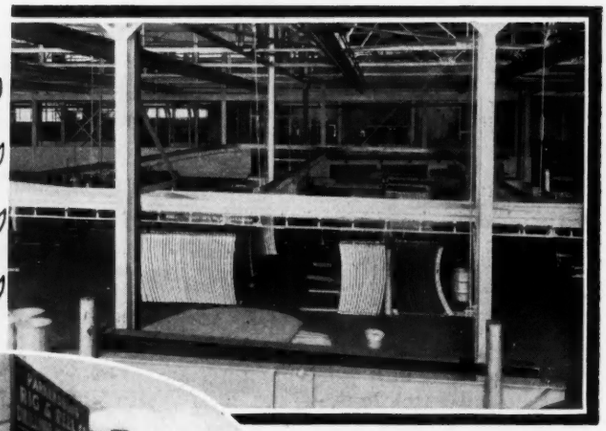
The MALONEY Bolted Steel Tank pioneered a type of tankage which has become as integral a part of standard production equipment as are the drill bit and derrick themselves. Today MALONEY Tanks are in use in every country where oil is produced. The company's plant at Tulsa, with its 400 feet of railroad siding, has a capacity of a carload of MALONEY equipment a day. The company maintains modern distributing organizations at all principal petroleum points throughout the Mid-Continent, Gulf Coast and Rocky Mountain oil areas.

See the installation of MALONEY Galvanized Tanks and Sectional Steel Stairways and Walkways, at the Petroleum Exposition.

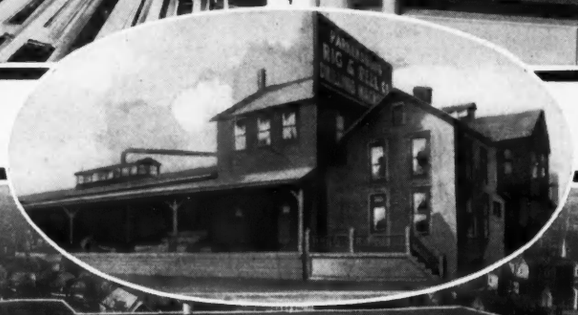
Interior view showing bundling and loading platform of derrick shop

Interior view showing overhead tram system and tank storage space



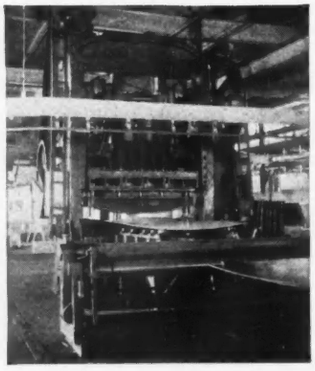


1897

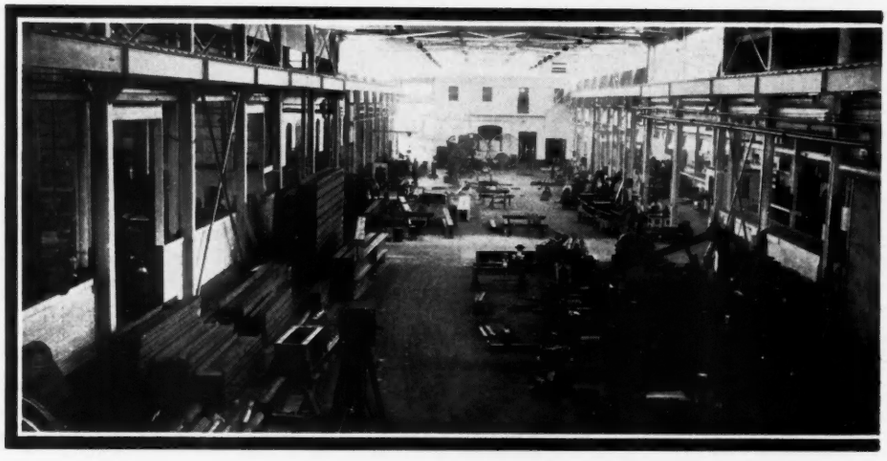


1936

Aerial view showing part of our present Parkersburg Plant. Oval inset above shows original Parkersburg Plant of 1897.



Flanging press used in fabricating steel tanks



Behind the Scenes with

PARKERSBURG

Quality and Service

Thirty-nine years is a wide swath from the scythe of time; particularly is this true in the history of American oil development. Before the turn of the century Parkersburg had established its plant and was manufacturing the relatively simple items required in the quest for oil. Today, after more than a third of a century, we contemplate with pride a career of engineering and mechanical accomplishments.

Parkersburg has kept pace with scientific and technical developments in "the industry". Whatever success we have achieved has been due, in large measure, to the singleness of purpose with which every step has been taken. From the inception of the company, Parkersburg has had one fundamental objective: to build equipment which would ask no compromise from the most difficult assignments; which would deliver dependable, economical service over a long period of useful life; equipment which would be mechanically perfect in every detail—yet reasonably priced.

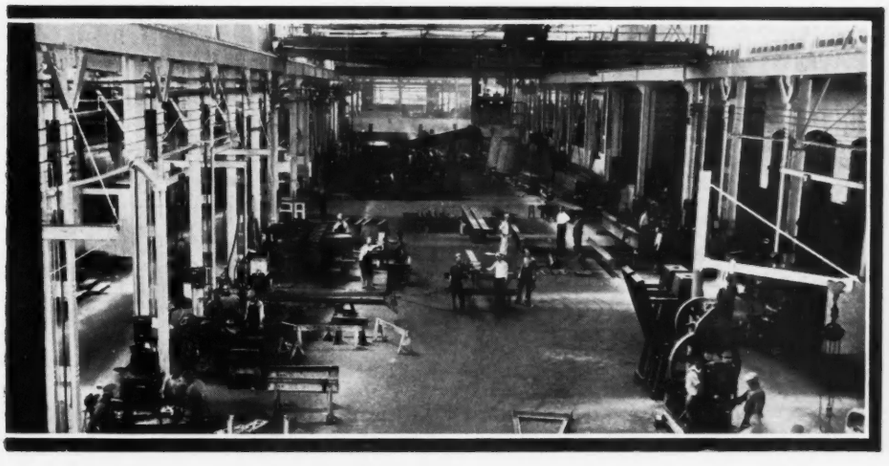
Parkersburg is thoroughly aware of the service requirements of the oil industry. We recognize the inestimable value of a dependable source of supply and to this end have established a nation-wide system of adequately stocked warehouses.

There is no substitute for QUALITY AND SERVICE

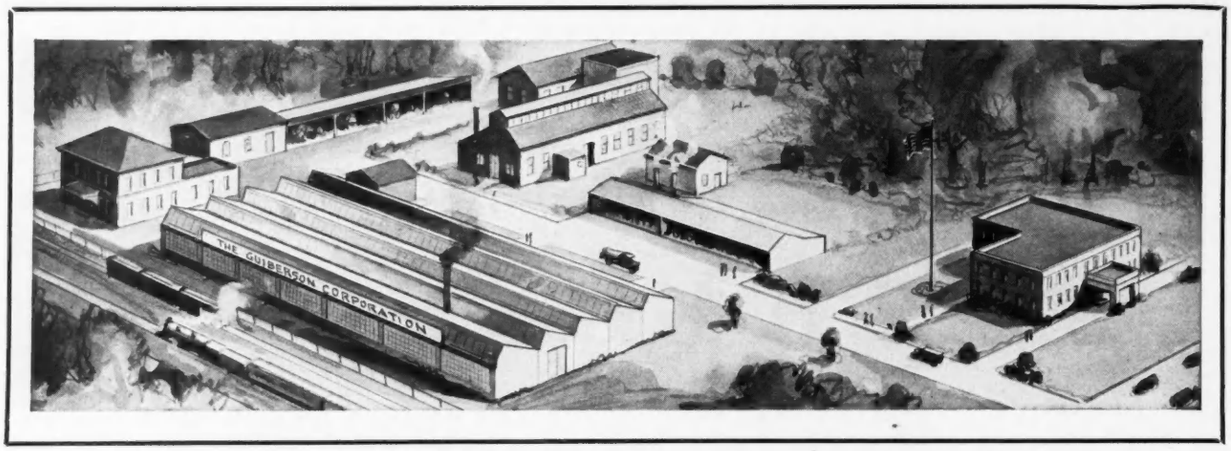
The PARKERSBURG RIG & REEL COMPANY

Parkersburg, West Virginia . . . . . Branches in All Active Fields

Below, and at lower left, views of steel equipment shop where rig fronts and pumping units are fabricated



Multiple punch press in steel tank fabricating shop



Artist's drawing of the Main Offices and Plant of The Guiberson Corporation, Dallas, Texas.

GUIBERSON'S CONTRIBUTION TO OIL INDUSTRY EFFICIENCY

The Guiberson Corporation has been more than just a manufacturer selling to the oil industry. So basic and important has been the service to the industry performed by many patented Guiberson specialties, and so universal has their use become among oil operators, that the history of the Guiberson Corporation is part and parcel of that of the oil industry itself. The automatic tubing catcher, the tool joint, the spiral bottom water plug, the flexible-cup swab, are today as much a part of standard drilling and producing equipment as are the derrick and the drill pipe.

The origin of the Guiberson Corporation may be rightfully fixed at the time Mr. S. A. Guiberson, Jr., entered into an agreement with W. H. Mills, of Coalinga, California, for the manufacture of what was later known as the Guiberson Casing Tong.

A short time thereafter Mr. Guiberson took over the exclusive rights, outside of California, for the Baker Casing Shoe.

In 1913 he entered into an agreement with L. L. Richard for the exclusive rights on his invention, the Automatic Tubing Catcher.

Then followed his agreement with W. H. Whittier, who invented the Rotary Tool Joint.

These four famous tools formed the nucleus for the business which later developed into the Guiberson Corporation, erected a modern manufacturing plant at Dallas, and enlisted the services of Mr. Guiberson's two brothers, N. G. Guiberson and W. R. Guiberson, his brother-in-law, R. S. Haseltine, D. W. Henke, and more recently his two sons, Allen Guiberson and Gordon G. Guiberson.

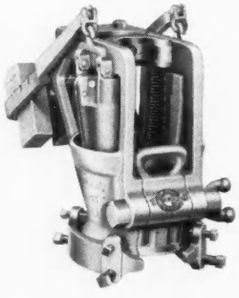
Tools in World-Wide Demand

The Guiberon Corporation has specialized in the introduction and manufacture of patented tools designed to increase

SOME MAJOR PRINCIPLES

Tubing Catcher

Flexible Swab



Tubing Spider with Guide Head

High-Pressure Tubing Oil Saver

the efficiency of oil field operations. In the years which followed incorporation many valuable patented tools were introduced, among which the most notable has been the flexible-cup swab. This swab revolutionized swabbing practice, and like the Guiberson Tubing Catcher, the Tool Joint, and other Guiberson specialties, it rapidly achieved a world-wide market. Other important members of the Guiberson family of tools are the Guiberson Control-Head Packer, the Guiberson Spiral Bottom Water Plug and Tubing and Casing Packers, the Guiberson Disc Bit, the Guiberson Underreamer, the Guiberson Tubing and Wire Line Oil Savers, and—very recently—the Guiberson Tubing and Casing Spiders, Tubing and Sucker Rod Strippers, and High-Pressure Oil Saver.

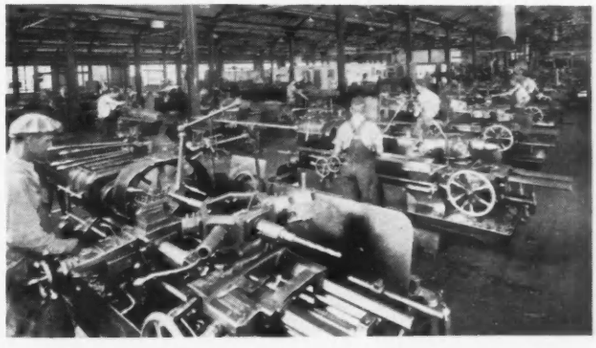
The last-named product—the Guiberson High-Pressure Oil Saver—is proving to be of great value for tubing and drilling wells under pressure, and though introduced only a few months ago it is already enjoying a wide demand. Other new Guiberson tools in demand and use are the Guiberson Sucker Rod Stripper, the Guiberson Type B Tubing Oil Saver, and the Guiberson Floor Block.

Company Keeping in Step with Latest Oil Field Practices

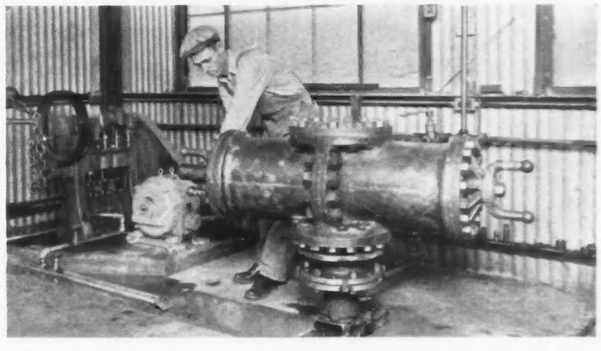
As a result of its many years of experience in producing high grade oil field tools, the Guiberson Corporation has developed the highest standards of precision manufacture. As the oil companies have progressed in engineering development and in their demand for efficient tools, The Guiberson Corporation has been likewise progressive. Every tool is not only manufactured by precision methods, but it is then thoroughly tested with modern testing equipment before leaving the shops. As a result, Guiberson tools have gained a world-wide reputation for quality and performance. The Guiberson Corporation takes pride in the fact that it has kept abreast of the times in modern factory machinery and workmanship, in engineering ability, and in maintaining the highest standards of service to the trade.

In line with its familiar slogan, "Better Be Safe Than Sorry," the Guiberson Corporation's policy is to make available to the Oil Industry tools which will increase the safety and efficiency of production methods. For information on any Guiberson product, address The Guiberson Corporation, Box 1106, Dallas, Texas, or Guiberson branch offices located in Tulsa, Oklahoma; Wichita, Kansas; Houston, Texas; Newark, Ohio, or Los Angeles, California.

Heat Treating Equipment, Guiberson Corporation Plant

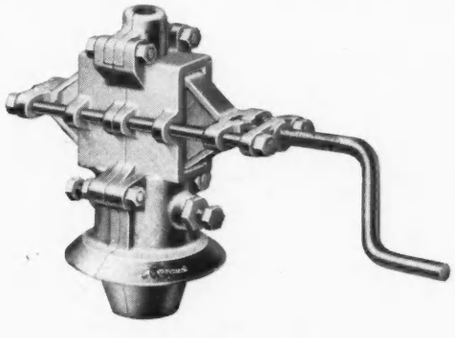


Portion of Machine Tool Equipment, Guiberson Corporation Plant



Section of Guiberson's Newest Department Showing Equipment Capable of Testing Oil Savers up to 10,000 Lbs. Test Pressure

PIONEERED BY GUIBERSON



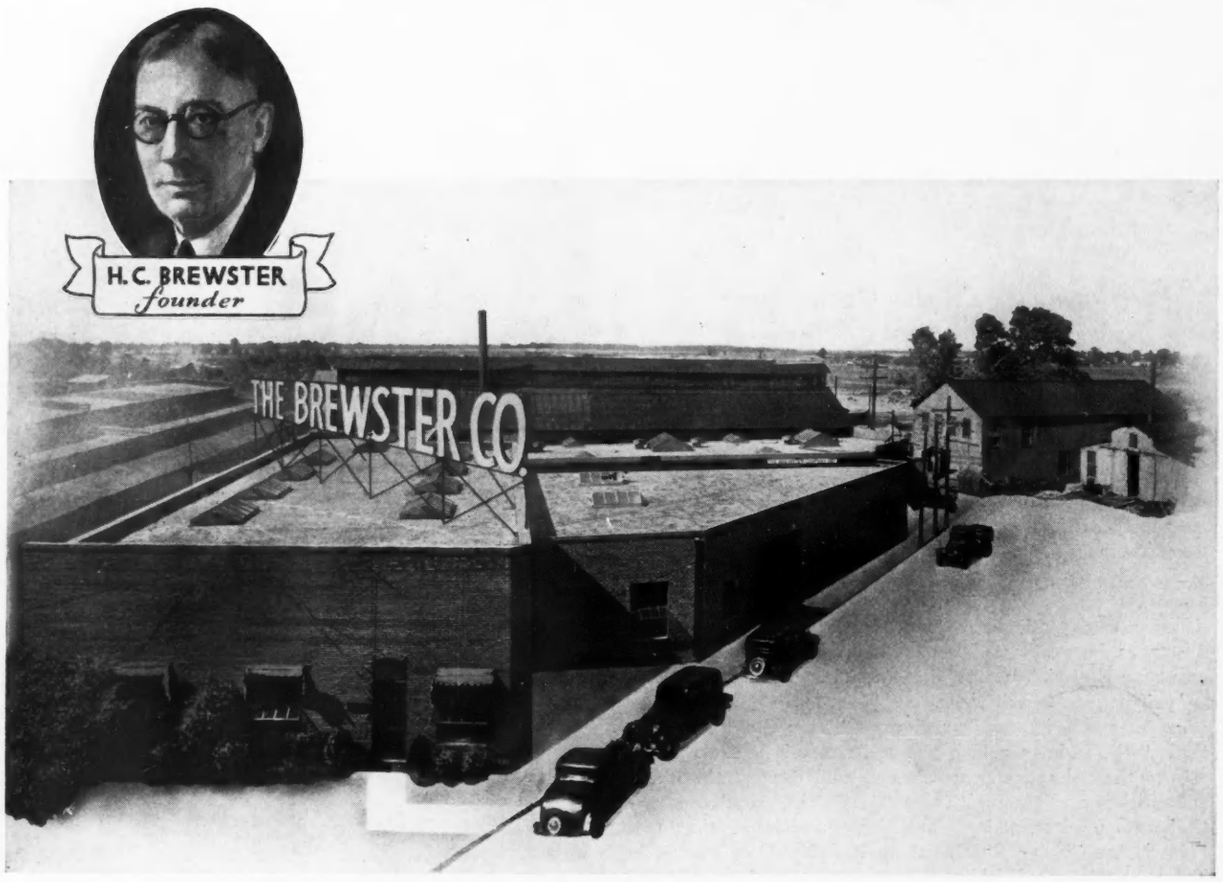
Pressure-Equalizing
Wire Line Oil Saver

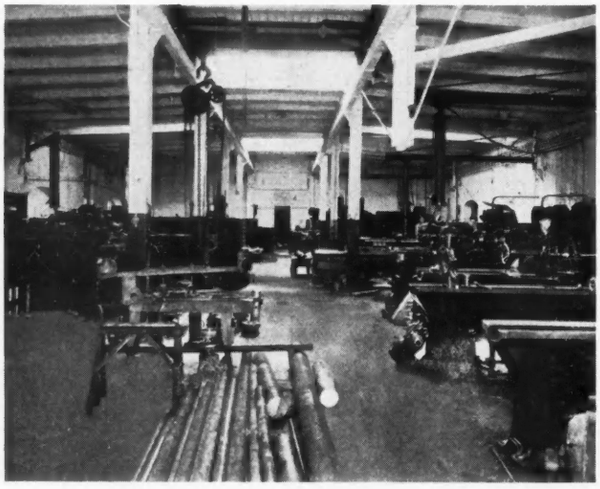
Type C Sucker
Rod Stripper

Control-Head Packer

Spiral Plug

BREWSTER . . . a Name Oil Field Equipment





Top: Bird's Eye View of the Great Brewster Plant in Shreveport, Louisiana.
Below: View of one end of the machine shop in the Shreveport plant.

THE BREWSTER COMPANY was founded at Oil City, Louisiana, almost thirty years ago by H. C. Brewster, and was then known as the Oil City Iron Works. Mr. Brewster had two associates.

Old Timers in the oil industry when the Caddo Field was young will remember that little machine and blacksmith shop at Oil City for the obliging spirit of its service and the excellence of its workmanship under Mr. Brewster's direction.

In 1915 a branch shop was established in Shreveport, Louisiana, which included a gray iron foundry. The site was the same now occupied by the Brewster institution.

Synonymous With Fine for Thirty Years

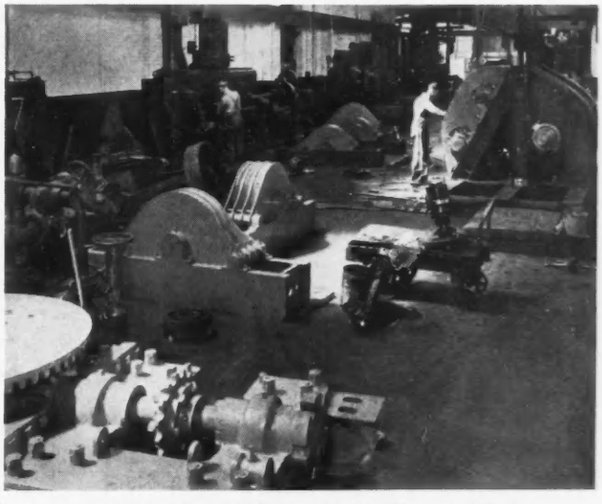
In 1917 Mr. Brewster bought out his associates. Under his management the business grew amazingly in volume and in usefulness to the oil industry. The founder died in 1933, but the business carries on under the management of Mr. A. O. Price, who has been with the institution for sixteen years and had his training in the crucible of experience under Mr. Brewster.

The modern Electric Steel Furnace making a pour.

One of the largest boring mills in the South, working on a giant casting.

With its modern machine shop and its great electric steel and gray iron foundries, the Company is equipped to make any piece of oil country equipment. And BREWSTER, for almost thirty years, has been a name synonymous with fine oil field equipment.

The BREWSTER COMPANY now has branch stores in all major Mid-Continent fields and enjoy a splendid volume of foreign business. The Company manufactures a full line of oil field equipment, including Rotaries, Drawworks, Rotary Swivels, Traveling Blocks, Crown Blocks, Casing Heads, Core Barrels, Drill Collars, Flow Beans, Set Shoes, Tubing Heads, Winches, etc. It renders the largest rotary bit service in the Mid-Continent.



Section of the BREWSTER Assembly Plant at Shreveport.

Home of the famous is Largest

The LAYNE *Wire Wrapped Screen* was invented by Mahlon E. Layne a well driller who, at the turn of the century, came to Texas in search of oil. His early activities took place in and around the Spindletop field, where in order to improve the production he developed a wire wrapped screen. It operated so effectively and other drillers were so eagerly demanding it, that Mr. Layne abandoned drilling in favor of the manufacturing business.

The first shop for the production of Layne-Wire Wrapped Screen was established in Houston, Texas, just 3 years after the Spindletop field startled the world. The plant was a one room affair where only 5 men were employed.

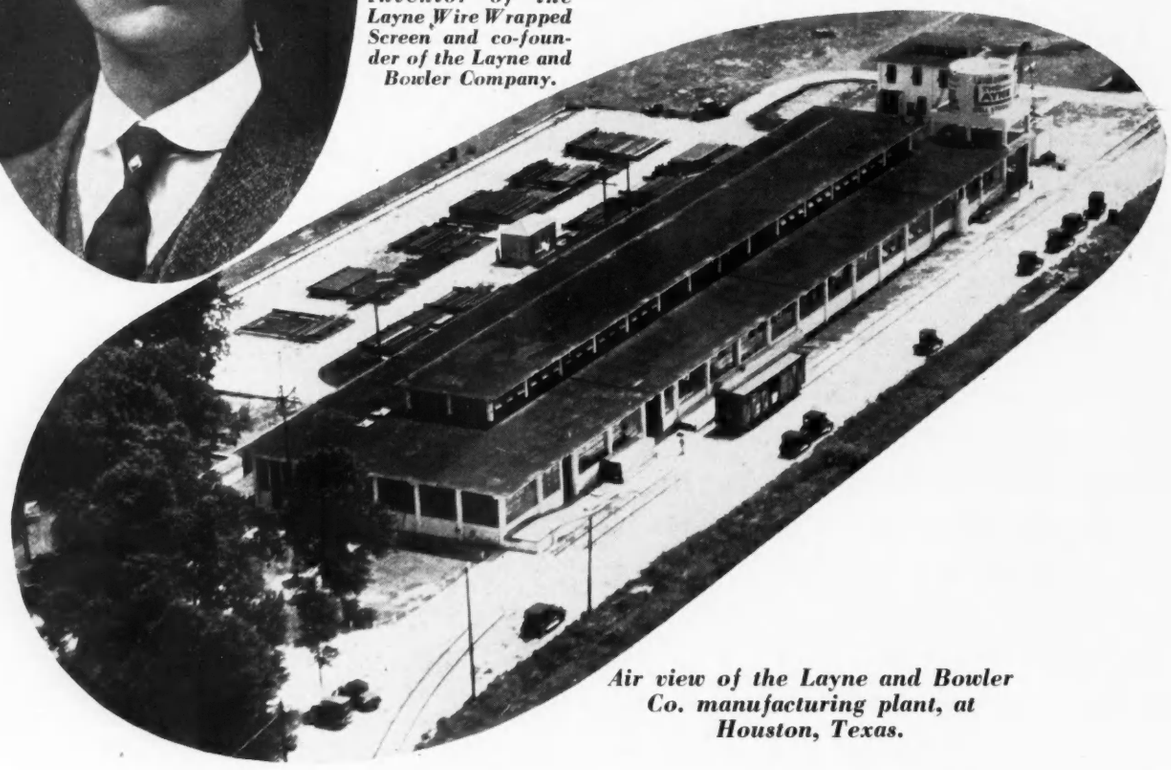
Success of the screen was so outstanding that shortly after the beginning of its manufacture, M. E. Layne and P. D. Bowler formed the Layne and Bowler Company with a larger shop and more skilled employees. The continued demand for the Layne Screen made it necessary to construct the present 5 acre plant of the Layne and Bowler Company.

This new plant is the largest of its kind. Its equipment includes many specially built machines to handle various phases in the manufacture of the Layne Screens.

From its inception the Layne and Bowler Company has devoted extensive engineering research to the improvement of the Layne Screen. While all Layne Screens are wire wrapped there are now three types of perforations, namely: the plain drilled, milled groove, and slotted pipe.

The Plain drilled type of screen has vertical staggered rows of perforations. The Milled Groove type has the same perforations plus a vertical milled groove over each hole in the pipe. This gives each opening a countersunk effect at right angles with the screening opening, thereby providing a greater inlet flow of fluid. The

MAHLON E. LAYNE
Inventor of the Layne Wire Wrapped Screen and co-founder of the Layne and Bowler Company.



Air view of the Layne and Bowler Co. manufacturing plant, at Houston, Texas.

LAYNE SCREEN *of its kind*

Milled Groove Screen was put on the market in 1928 and received immediate acceptance by the industry. Reports of increased production prove it is the greatest improvement in screens since the original Layne Wire Wrapped Screen was made in 1904. The Slotted Type screen has vertical staggered slots instead of holes.

Precision, accuracy, and quality are the predominating factors in the manufacture of Layne Screens. Special built machines automatically space and lug the wire to form accurate openings from 4/1000 of an inch to any gauge desired. These openings are kept accurate by micrometer controlled sizers.

The wire next to the pipe is a few thousandths of an inch smaller than the outside. thus producing an opening between the wires that is wider next to the pipe than it is at the screening surface.

Each wrap of the wire is placed directly on the pipe—not raised or elevated. This permits wrapping the wire under pressure with the proper tension. It assures a more uniform gauge and a stronger, more rigid screen.

A specially built machine wrapping wire on a Milled Groove pipe.

The wire is attached to the pipe by vertical rows of solder and finished off at start and finish with tapered solder collars. The end of the wire on the original coil is electric butt-welded to the part already wrapped on the pipe, thus forming a continuous wire the entire length of the screen.

The outside diameter of the screen is smaller than the outside diameter of the couplings on the pipe.

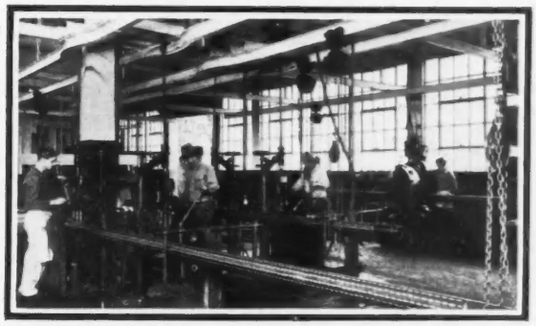
Layne Screens can be made on any size or kind of pipe up to 16 inches in diameter. They can be made any length with any number of perforations desired. Screens can be wrapped with Admirality Brass, Commercial Bronze, Galvanized Steel, Nickel or Enduro wire (stainless steel).

In addition to the Layne Screen, the Layne and Bowler Company manufactures an improved Ratchet Packer and a Screw Thru Setting Tool that is the marvel of the industry. This combination of Setting Tool and Packer is the acme of simplicity and efficiency. Eleven turns releases the setting tool from the packer. When weight is set down on the packer the 42 inches of finely woven, spirally wrapped canvas is forced outward as well as downward to produce an almost iron hard pack, approximately 20 inches in length.

Other well known Layne products manufactured in this modern plant include, Double Seal Ratchet Packer; All Canvas Ratchet Packers; Canvas Mother Hubbard Packers; Canvas Pin Packers; Setting Tools; Lead Seals; Seamless Steel Set Shoes; Brass Back Pressure Valves; Cast Iron and Steel Guide Plugs; Wash Rings; and Setting Nipples.

The Layne and Bowler Company general office and factory is in Houston, Texas, U. S. A. Exports are handled through the Layne-New York Co., 92 Liberty St., New York City. Layne products are also sold by the Layne and Bowler Corp., Los Angeles, Calif., and supply companies.

Special machine, milling the grooves for a Layne Screen.



Four multiple drill presses perforating pipe.

REG. U.S. PAT. OFF.
TRADE
JENKINS
MARK

Jenkins Bros

A SYMBOL

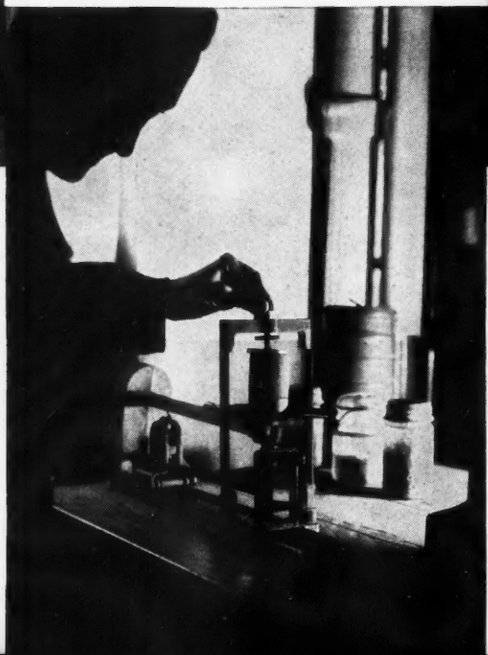
made famous by Three Extra Values

MORE IMPORTANT than design or construction in establishing the worth of Jenkins Valves are three hidden extra factors: the *Materials* that go into them; the *Men* who make them; the *Integrity* of the maker back of them. These things no specification or order can assure; no instrument can measure. Yet, in them lies the difference between Jenkins Valves and others. They put into a "Jenkins" the extra-measure of quality that makes it consistently last longer and work better.

JENKINS BROS., 80 White St., New York; 510 Main St., Bridgeport, Conn.; 524 Atlantic Avenue, Boston, Mass.; 133 N. Seventh Street, Philadelphia, Pa.; 1822 Washington Blvd., Chicago; JENKINS BROS., Ltd., Montreal; London

Materials

There is no mystery back of the famed ability of a "Jenkins" to handle ordinary duty with an ease that means longer life and less maintenance, or to "carry-on" even when extraordinary strains are encountered. Valve stamina is in direct ratio to the quality of the materials put into it. And a "Jenkins" is made of the finest. Only virgin metals that stand critical analyses and tests can get into Jenkins castings. Even the foundry sand has to be of exceptional quality, proved in special testing apparatus like the Crusher shown below.



Men

A Jenkins Valve could not be the dependable product it is except for the men who stand at the benches and machines in the Jenkins plant. No ordinary workers are these, but *Craftsmen.* They have the skill that comes only with years. In the Jenkins plant, a workman is a "youngster" until he has followed his art for a score of years. But, more important than experience, is their pride in making valves as fine as they can. It might be called "old-fashioned" but it gets the superlative quality thousands of valve users demand.

Integrity

Seventy years ago, the now famous Jenkins policy of building to a plus standard of value was instituted. This policy has built the universal faith of engineers in any "Diamond" marked valve, and to keep this faith is Jenkins' determination. From ingot to the packing table, quality is continuously checked by an elaborate system of inspection and testing that guarantees the capability of every Jenkins Valve when it reaches the buyer. Shown above is the Shell-and-Seat test which every valve must pass.

Pipe Reconditioning

NEW DEAL EQUIPMENT INCREASES RECOVERY, SAFETY AND PROFITS

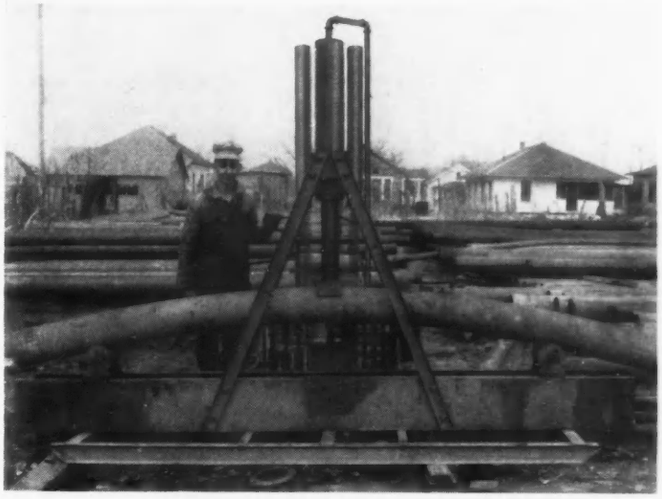
Realizing the importance of the safety and economy factors in used pipe, the New Deal Specialty Company, Okmulgee, Oklahoma, after three years of exhaustive research, engineering work and actual field tests, have perfected a number of devices for the reconditioning of pipe and casing. These units are eliminating the hazard to life and property, and the waste of discarded material, by permitting the greater recovery of properly graded and inspected used pipe.

The New Deal Company are the manufacturers of pipe cleaning machines, pipe straightening and pipe bending machines, dent removers and pipe-line tri-pod hoists.

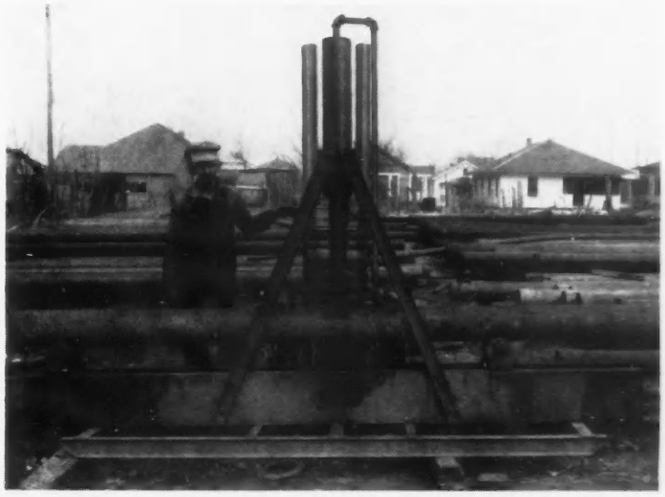
The New Deal Pipe Cleaning Machines, combining engineering research, manufacturing skill and practical field experience, have brought an important development in this line of equipment. They are sturdily constructed units for the rapid, efficient, economical removal of dirt, rust, scale and corrosion from the surface of pipe and casing. Made in three models and several sizes to meet the specific needs of oil and gas companies, pipe lines, utilities and pipe yards.

The New Deal Duo-Hydraulic Pipe Straighteners and Bending Machines, because of their engineering design, super construction, speed, power and flexibility, bring new possibilities in the reclamation of bent and crooked pipe, casing, rotary drill stems, and Kellys, structural steel, rails, round and flat iron, etc. Made in five models of varying power, strength, capacity and speed, there is a size and style to meet your most exacting requirements.

All of these New Deal products will be seen in operation at the Ninth International Petroleum Exposition.



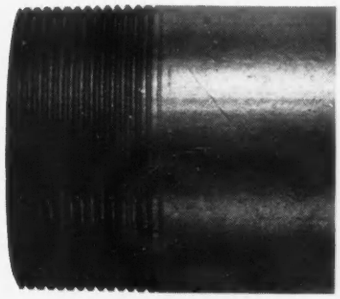
Crooked Pipe in Duo-Hydraulic Straightener



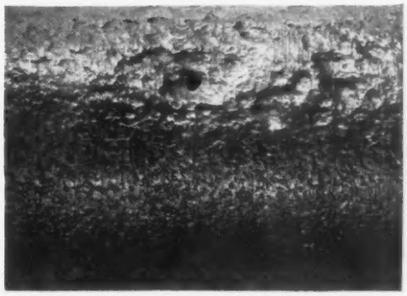
Pipe restored to normal (straight)

The three pictures below graphically illustrate the value of cleaning pipe the New Deal way

Under the Dirt and Corrosion—



Is your pipe like this?



or this?

S. P. TSCHAPPAT
General Manager

H. CALLAHAN
In charge of Manufacturing

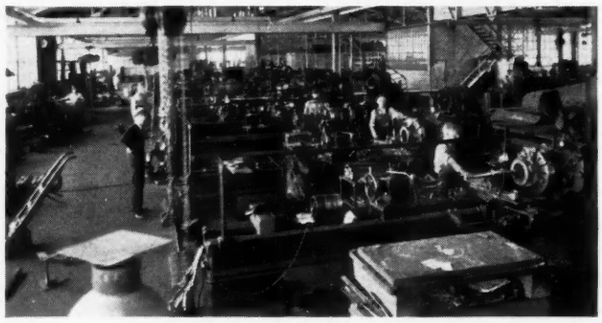
JOE LALEY
In charge of Warehouse

L. C. RHOADS
Texas Branch Manager

THE HERCULES TOOL COMPANY PIONEERS OF "OVERHEAD PACKING"

The Hercules Tool Company—manufacturers and distributors of oil well specialties—was founded in 1925, at Tulsa, Oklahoma, by S. P. Tschappat and H. Callahan.

Mr. Tschappat had been identified with the oil industry for many years previously, in a number of different capacities including oil producing and oil tool manufacturing. Mr. Callahan had spent many years in the drilling contracting business.

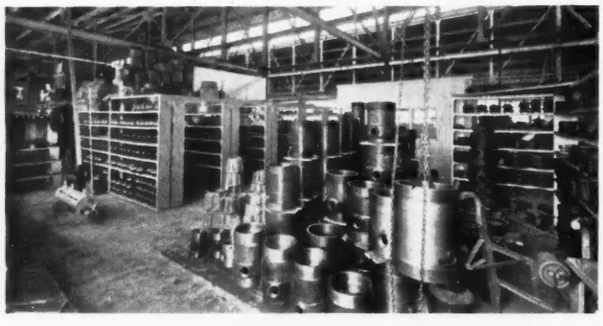


Where HERCULES Tools are made.

The first oil well specialties introduced by the Hercules Tool Company were the HERCULES Tubing Anchor, Tubing Hanger and Tubing Spider. It was at that time that Hercules pioneered the now famous "overhead-packing" idea. This improved method of packing *above* the slips permits repacking and adjustment of pressure on the packing without disturbing the well connections in any way. It also affords maximum protection to packing, so that it is not cut out or broken down, as is apt to happen where the weight of casing or tubing is carried on slips above the packing.

Stock Room—showing part of stock of Hercules Tool Co.

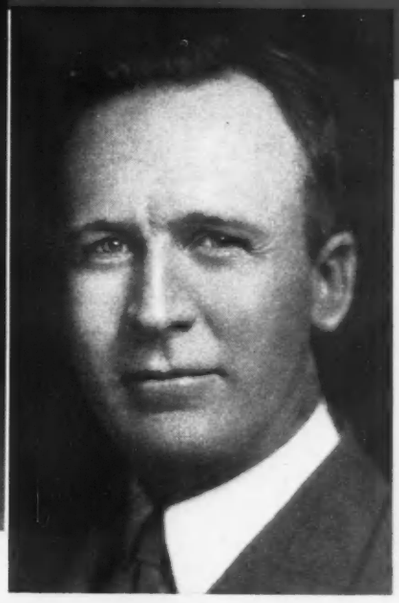
"Overhead-packing" has been successfully applied in several Hercules specialties, and has been an important factor in gaining for these specialties the wide recognition and favor they enjoy. "Overhead-packing" is a feature of HERCULES Forged Steel and Cast Steel Casing Heads, HERCULES Tubing Hangers, HERCULES Tubing Heads and HERCULES Flow Heads. ¶ The main office and manufacturing facilities of the Hercules Tool Company are located at Tulsa, Oklahoma. A branch office is maintained at Ft. Worth, Texas.



Assembly Room of Hercules Tool Company.

W. L. CHILDS
Vice President—General Manager

S. P. FARISH
President



R. G. HAMAKER
Vice President—In Charge of Sales

An Invitation

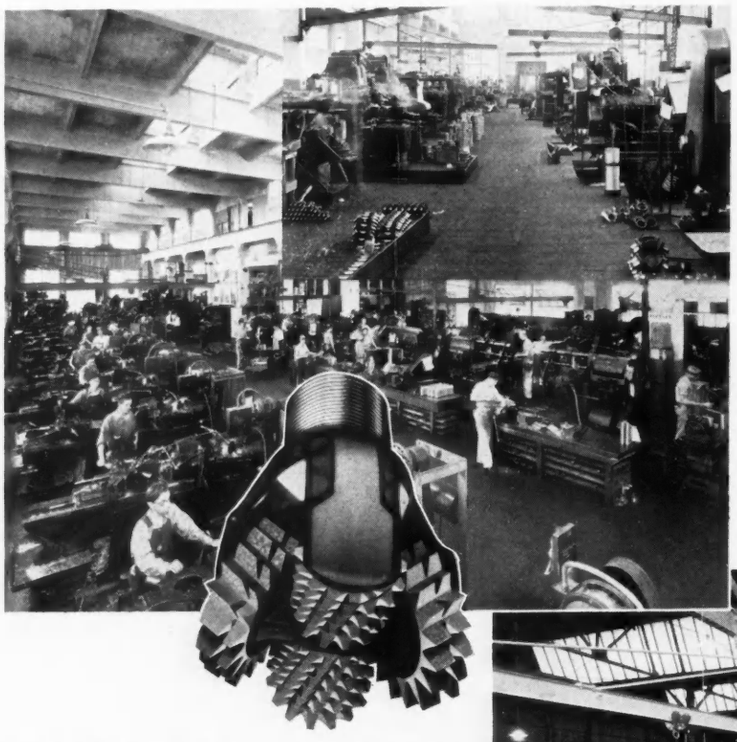
Users of rotary drilling equipment are cordially invited to visit the main plant of the REED ROLLER BIT COMPANY IN HOUSTON, where a personally conducted tour through the shops will be provided, during which the many operations and processes pertaining to the manufacture of Reed products can be observed.

The few pictures shown on the following pages can only give you a partial conception of the enormous number of machines, scientific equipment, and processes used in the manufacture of Reed tools. We hope your seeing these pictures will remind you to visit our main plant on your next visit to Houston.

HOME OFFICE - *Houston*

REED ROTARY DRILLING TOOLS

SPEED · ECONOMY · DURABILITY



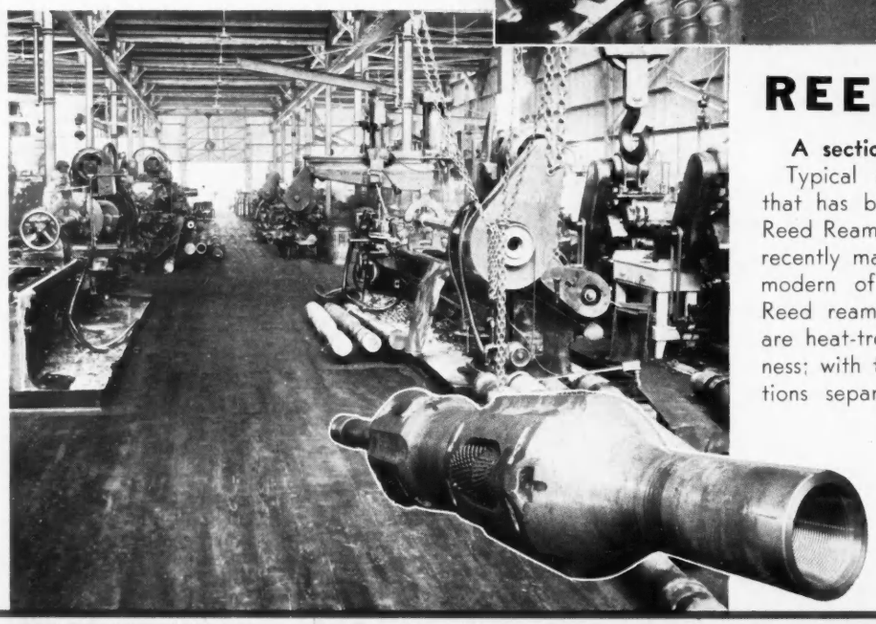
REED ROCK BITS

To manufacture Reed Rock Bits, hundreds of precision operations take place in the Reed plant on the journey from the forge shop, through the heat treating plant, and through machine shops; with chemical, metallurgical and inspection departments performing important functions along the way.

Only by following the manufacture of Reed bits from the rough to finished products can one begin to see why Reed Rock Bits outlast others.

REED TOOL JOINTS

Here you see a corner of the well-equipped tool joint department of the Reed Roller Bit Company, where specifications call for unusually accurate machining under rigid inspection. Modern machines and heat-treating equipment for every operation, plus painstaking care in chemical, metallurgical, and inspection control, results in the manufacture of **tool joints of insured quality and greater endurance.**



REED REAMERS

A section of the Reamer Department

Typical of the painstaking thoroughness that has brought outstanding leadership to Reed Reamers, the Reed Roller Bit Company recently made huge investments in the most modern of heat-treating equipment. Here Reed reamer bodies and Reed drill collars are heat-treated to develop extreme toughness; with the integrally forged end connections separately heat-treated to tool joint hardness.

Reed Reamers stiffen the drill stem and concentrate the weight perpendicularly on the bit causing it to dig ahead efficiently on its guided straight course.

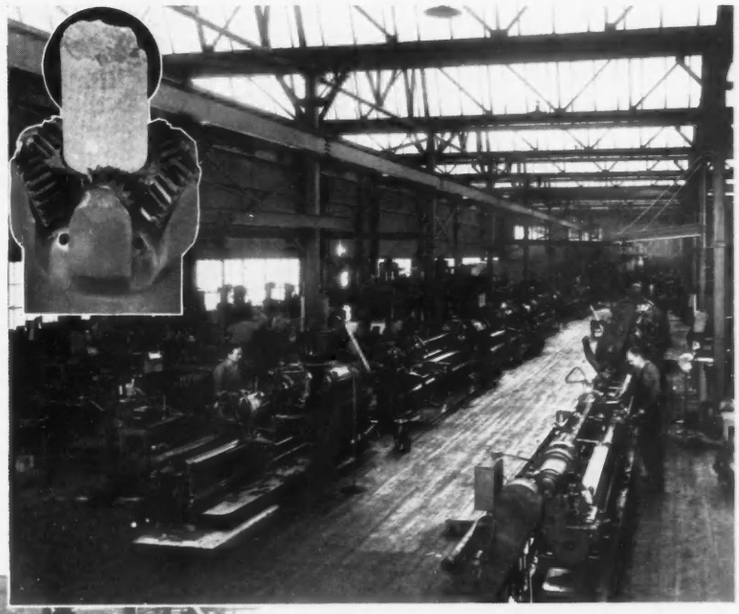
REED ROTARY DRILLING TOOLS

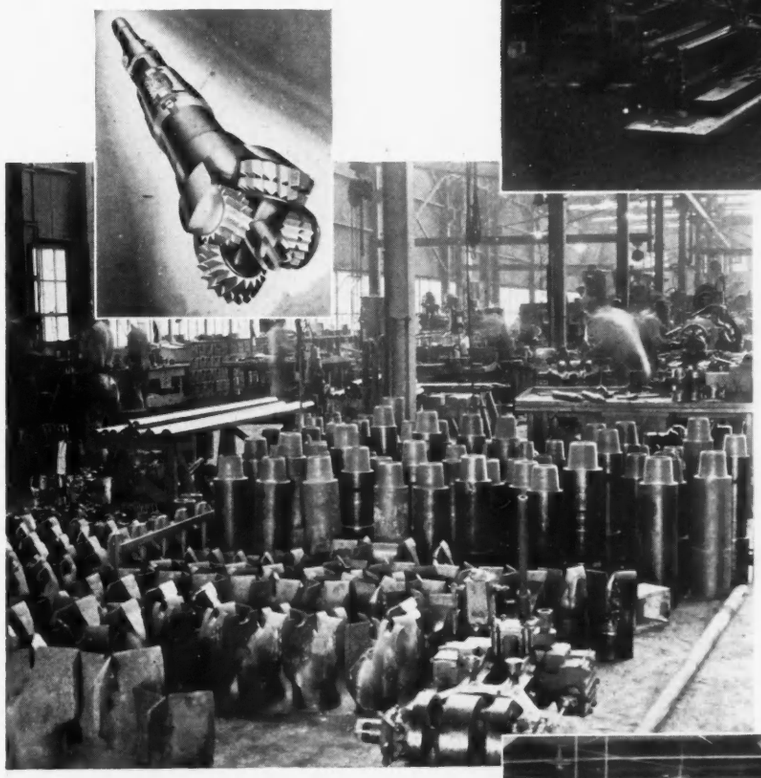
SPEED · ECONOMY · DURABILITY

REED Model B CORE DRILLS

Here we see a corner of the Reed Model "B" Core Drill Department. These modern machines are specially designed and equipped for the precision work Reed demands in the manufacture of Reed Core Drills.

Reed Model "B" Core Drills take cores close to the bottom of the hole . . . and give larger diameter, longer cores in less time and at lower cost.





REED B-R DRILLING-CORING BITS

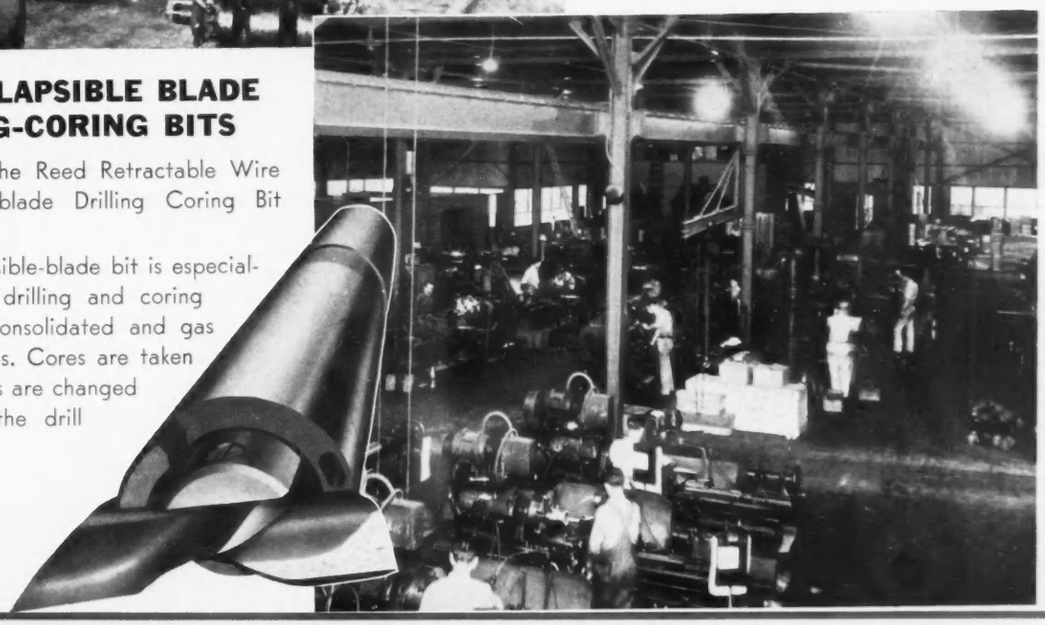
The picture at the left shows a corner of the Reed Barrett-Robishaw department, displaying part of the ample supply of various sizes of drilling bits and core barrel parts maintained at all times to serve the operator quickly in line with the Reed policy of SPEED—SERVICE—DEPENDABILITY.

The Reed Barrett-Robishaw Drilling Bit with Wire Line Retractable Core Barrel takes any number of cores from any depths, without removing the drill stem. Hard and soft formation heads are interchangeable on the same barrel.

REED COLLAPSIBLE BLADE DRILLING-CORING BITS

A section of the Reed Retractable Wire Line Collapsible-blade Drilling Coring Bit Department.

The Reed Collapsible-blade bit is especially adapted for drilling and coring heaving or unconsolidated and gas bearing formations. Cores are taken and drilling blades are changed without pulling the drill stem.



REED
ROTARY DRILLING TOOLS
SPEED-ECONOMY
DURABILITY

(Top left) **Reed's Modern Metallurgical Equipment for Controlled Heat Treatment**—Latest types of electrically operated, automatically controlled heat-treating furnaces, designed for accurate heat-treating of Reed tools. Pyrometer controlled for uniformity.

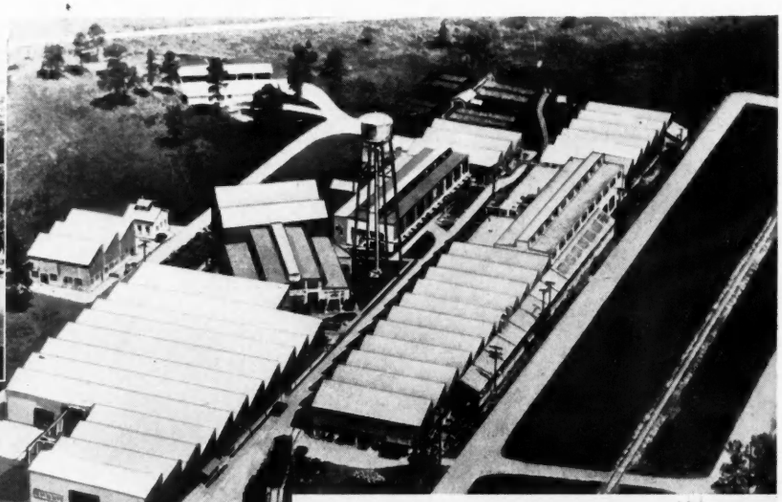
This finest equipped heat-treating plant assures buyers that the **metal they get in Reed Tools lasts longer because it has the scientific ratio of toughness, hardness, and maximum ductility to meet the utmost strain of deep well service.**

24-hour service, 7 days a week of this battery of heat-treating furnaces is necessary to keep up with the world-wide demand for Reed Tools.

(Top right) **A corner in the Chemical Laboratory**—LABORATORY TESTS AGAINST SPECIFICATIONS are made of all steels before they can be used in the making of Reed tools. Thus is Reed's standard for using only the finest steels maintained and **maximum service from Reed products assured.**

ONE-TEN THOUSANDTH OF AN INCH LOOKS LIKE A MILE TO THESE TRAINED EYES using the finest inspection equipment for safe-guarding the high standards of precision Reed demands of all products before they go to the shipping department. Users are thus assured of uniform dimensions within unusually close tolerances.

LOS ANGELES BRANCH



OKLAHOMA CITY BRANCH

THE STORY OF TNEMEC'S CRUSADE AGAINST CORROSION

Industrialists are accustomed to take their losses from corrosion as a matter of course, and few realize that the nation's rust loss far exceeds its fire loss, being estimated at $500,000,000 annually.

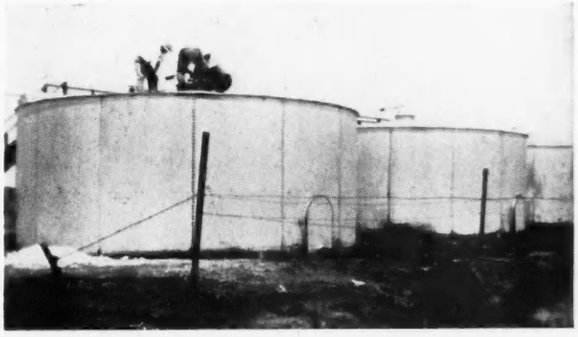
In 1920, A. C. Bean, of Kansas City, after considerable study of the problem of combatting rust, made two basic discoveries in this field. He discovered, first, that the formation of rust on exposed iron or steel surfaces is *continuous*—that incipient, invisible rust is forming every instant on such surfaces. Thus even a thoroughly cleaned steel surface will acquire an invisible coating of incipient rust immediately after any cleaning process and *before* a protective coating can be applied. There, under the paint, this rust would continue its corrosive action and soon undermine the coating.

His second discovery was a pigment for protective coatings which would kill this incipient rust, acting chemically on the rust (ferric oxide) and changing it into harmless calcium ferrite. Mr. Bean and his associates patented the process of combining this new "Tnemec" pigment with pure linseed oil, the best vehicle known for obtaining durability in protective coatings.

Tnemec No. 6 Red Primer Actually *Kills* Rust

The first product perfected by the Tnemec Company, Inc., was a priming coat for iron and steel known as Tnemec No. 6 Red Primer. By killing incipient rust this coating is able to make a perfect bond with the metal. Finish coatings were then perfected which would protect this valuable priming coat from the adverse conditions met with in industry.

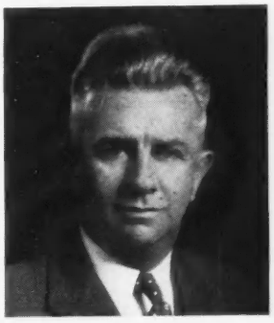
Today the company offers specialized coatings for every industrial requirement. These coatings have shown amazing durability, many instances being on record where they have stood up 6, 8 and even 10 years, protecting the surface beneath against the slightest trace of corrosion.



RIDDLED TANKS RECLAIMED BY TNEMETANK
Bottoms became riddled with small holes, July, 1932. Tnemetank stopped all leakage and tanks continue in service today.

Tnemec Industrial Coatings *Stick to Galvanized Surfaces*

The painting of galvanized iron was one of the problems solved by Tnemec Company. It has been generally experienced that paints will peel from a galvanized surface within a short time, but Tnemec Industrial Coatings make a positive bond with galvanized iron, giving, in instances, even under adverse conditions, 8 to 10 years service.



A. C. BEAN
President, Tnemec Company, Inc.

J. B. RAY
Vice-President and Director of Sales

Super-Tnemecol for *Underground Pipe Lines*

The company has also perfected a coating for use with Tnemec Primer on underground pipe lines. This coating, known as Super-Tnemecol, has recently completed a test period in the nation's worst "hot-spots" where conditions had rendered it necessary to replace lines consistently within 2 years. All Super-Tnemecol tests were left in the ground 18 months to 2 years, then examined. In every instance the coating was found to be intact and the pipe beneath in perfect condition without a trace of corrosion.

Tnemetank for Protecting *Tanks Against Sour Crude*

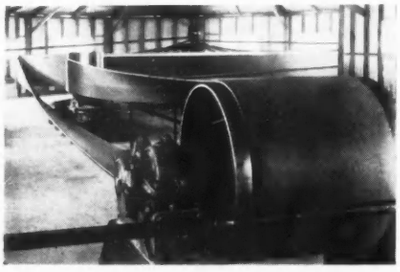
The Tnemec product which has attracted widest attention in the Oil Industry has been Tnemetank No. 469, for coating tank interiors in the "sour crude" areas. Applied after tank is erected, TNEMETANK produces a thick, leather-like coating which bonds perfectly with the new or cleaned steel surface, is unaffected by even the worst sour crudes, and prolongs the life of steel tankage indefinitely. Originally developed for the sour crude areas, it is now recommended for all steel tankage, large and small, in all areas.

Tnemetank is especially effective for reclaiming old steel tanks, as the thick coating will plug small holes and give the tanks added years of usefulness.

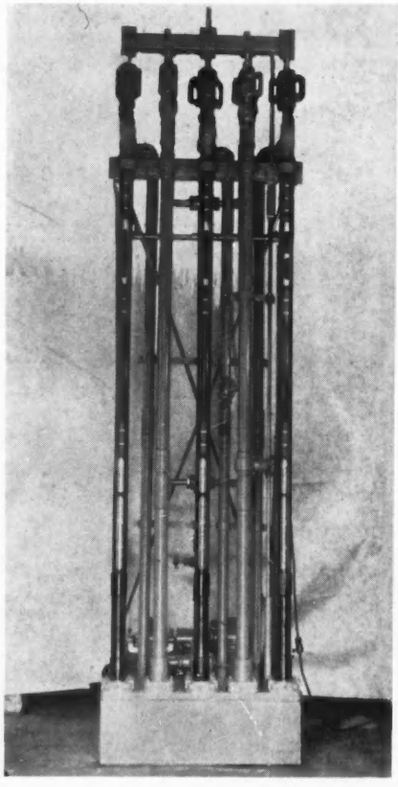
An efficient field organization has been developed, and operators can now order new tanks on a "turn key" basis specifying interiors to be Tnemetank-coated. Coatings applied by the manufacturer's trained and authorized appliers are given a guarantee—3 years on new tanks, 2 years on old.

Tnemec products will be on display at the Petroleum Exposition, Booth 7, Arcade Way. See 1936 Composite Catalog, or address Tnemec Co., Inc., 3122 Roanoke Road, Kansas City, Mo.

Here's Your Through



REPUBLIC Super Excello Power Belt



AXELSON Pumps with cut-away and Transparent Sections.

DEAR BILL:

Sorry you couldn't make the grade this year. It's a great show, and the Frick-Reid Building alone is worth the trip. It's the talk of the Exposition.

Mounted on four tall steel columns, so that it is overhead just inside the main entrance, is a Reid Bandwheel Power. The Bandwheel protrudes through an aperture provided in the building above the entrance, and turns at the rate of about eight revolutions a minute. Mounted on this revolving Bandwheel is the FRICK-REID name in Neon.

After folks get through staring at this giant overhead, about the next thing that catches the eye of the thirsty is a drinking fountain with an electric eye. The blamed thing seems quite intelligent, too. As you stoop to a drinking position it promptly and automatically produces a little stream of iced water!

The Republic Rubber Company has the first exhibit to the left. I was particularly interested in what they call their "Super Excello" Transmission Belting. I have heard Frick-Reid customers say it is one belting that really can take the jars, jolts, tugs, wrenches, racks and shocks of all-around oil country service—and like it! It's made of hard, close woven silver duck impregnated with friction compound. It looks to me like a good product.

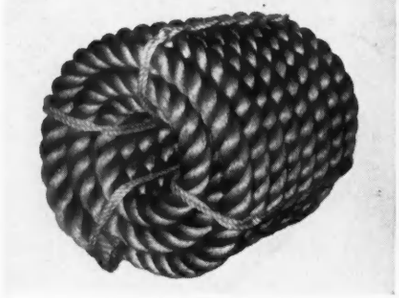
Next to Republic Rubber, Frick-Reid has a telephone exchange that certainly is popular. I darned near missed the rest of the exhibits by hanging around the crowd at that telephone counter. And of course *everyone* knows what a telephone looks like! It's just possible that all the interest hinges about the fact that men don't make good telephone operators and Frick-Reid knows it. That picture post card of the Frick-Reid Exhibit Building that I sent you was addressed, stamped and mailed right there—with feminine neatness and dispatch. You were just an excuse!

I finally broke away and went over to the Axelson exhibit in the left end of the building. They have in operation a series of Axelson Pumps with cut-away and transparent sections, which certainly is interesting. I really got a pretty good insight into why Axelson Pumps and Sucker Rods are such universal favorites with Frick-Reid customers who have production.

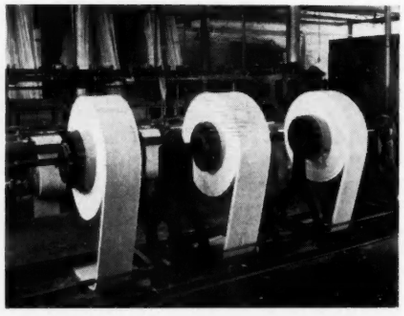
The Whitlock exhibit follows Axelson, and it's a dandy. You know they have been in the rope business ever since Heck was a pup, and everyone from boy scouts to corporation presidents seems interested in rope. Of course their display includes their Manila Drilling Cable, Bull Rope and Spinning Lines and what they call their Whitlock "Waterflex" Manila Rope and Cat Line.

Raybestos-Manhattan, Inc., has the next exhibit—but I reckon I don't need to show you a picture or draw you a diagram of brake lining! I've heard it said that Frick-Reid does customers and the industry in general a real favor by making Raybestos Rotary Brake Lining available through Frick-Reid field stores everywhere.

Midwest Piping & Supply Company has a mighty interesting exhibit of



WHITLOCK Bull Rope



RAYBESTOS Silver Edge Brake Lining. Front view of the giant loom which weaves it

Round Trip Ticket the FRICK-REID EXHIBIT!

Welding Fittings and fabricated pipe. Bucking tongs ain't what it used to be, Bill, and I reckon a pipe line is a pipe line the way they put 'em together today!

Here at the Blaw-Knox section—I think of safety. Their steel gratings for instance have saved many a bad slip in dangerous territory and their Pipe Line Tracyfiers and Gas Cleaners —well, you know what dirt means in a pipe line.

J. P. Ratigan has an exhibit of the "Sure-Grip" line of pumping equipment, including Grips, Clamps, Beam Hangers, Rod Elevators, etc. Frick-Reid seems mighty proud of the No. 12 Walking Beam Rocker and the No. 85 Rod Hanger, but of course the entire Ratigan line is a best seller, and no wonder.

Nearby I found some J & L and Walworth products. Just a few, and was referred to the large exhibit of these concerns in another location. You know, Bill, Frick-Reid is a large distributor of Jones and Laughlin Steel Corporation's tubular goods and Walworth valves and fittings.

The Linear Packing & Rubber Company exhibit includes some outstanding types of packers which have commanded much attention in oil circles this year. One is a ring packing known by the brand name "PAR." Its distinctive cross section design is shown in the picture I am sending you. The higher the pressure the tighter the lips expand. It takes care of some tough jobs: Hydraulic, High Temperature, Hot Water, Oil Service, Distillates, etc.

Back of Frick-Reid's main building are further interesting exhibits under a great roof. Reid Engines, for instance. One drives a Dreadnaught (Beaumont Iron Works Company) Junior Beam through a Foote Gear Unit. Another—the Reid Type D. C. 12½" x 16" Two-Cycle Twin Cylinder Full Diesel—is hooked up with the new No. 11 Dreadnaught Draw Works.

I don't need to tell you, or any other oil man, about the quality of Foote Reduction Gears for pumping units. And let me say this: That new No. 11 Dreadnaught Unitary Drawworks will go places!

National Transit Pump & Machine Company has a good show in this semi-open building, too. If you havn't seen the Transit Horizontal Duplex Totally Enclosed 10" Stroke Power Pump with Removable Liners, you've missed something. And if you aren't interested you'd better not get one of the Frick-Reid boys started on the subject of Transit Pumps!

Well, Bill, I finally strolled back out through the main Frick-Reid Building, but I had more business at the telephone exchange and another drink of water from that thing with the electric eye before I found myself on Drake Drive. I'm going back through that Frick-Reid exhibit before this show is over!

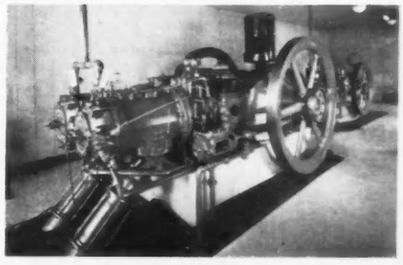
I'm tired and my feet hurt. Hoping you are the same, I am,

yours truly,

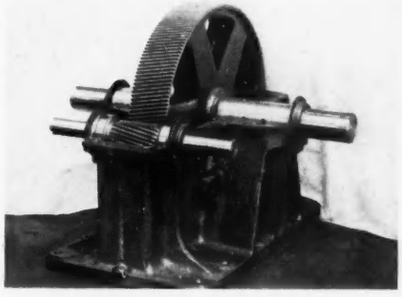
JIM.

RATIGAN No. 12 Walking Beam Rocker

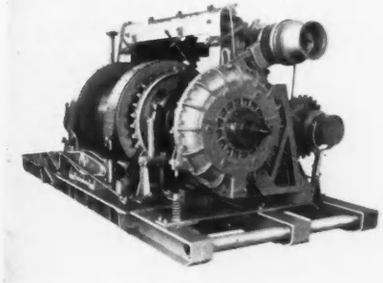
"PAR" Ring Packing—Linear Exhibit



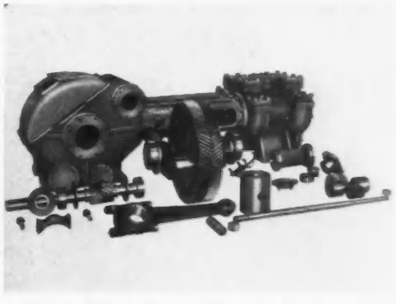
REID Type DC, 12½ x 16" Two Cycle Twin Cylinder, Full Diesel Engine



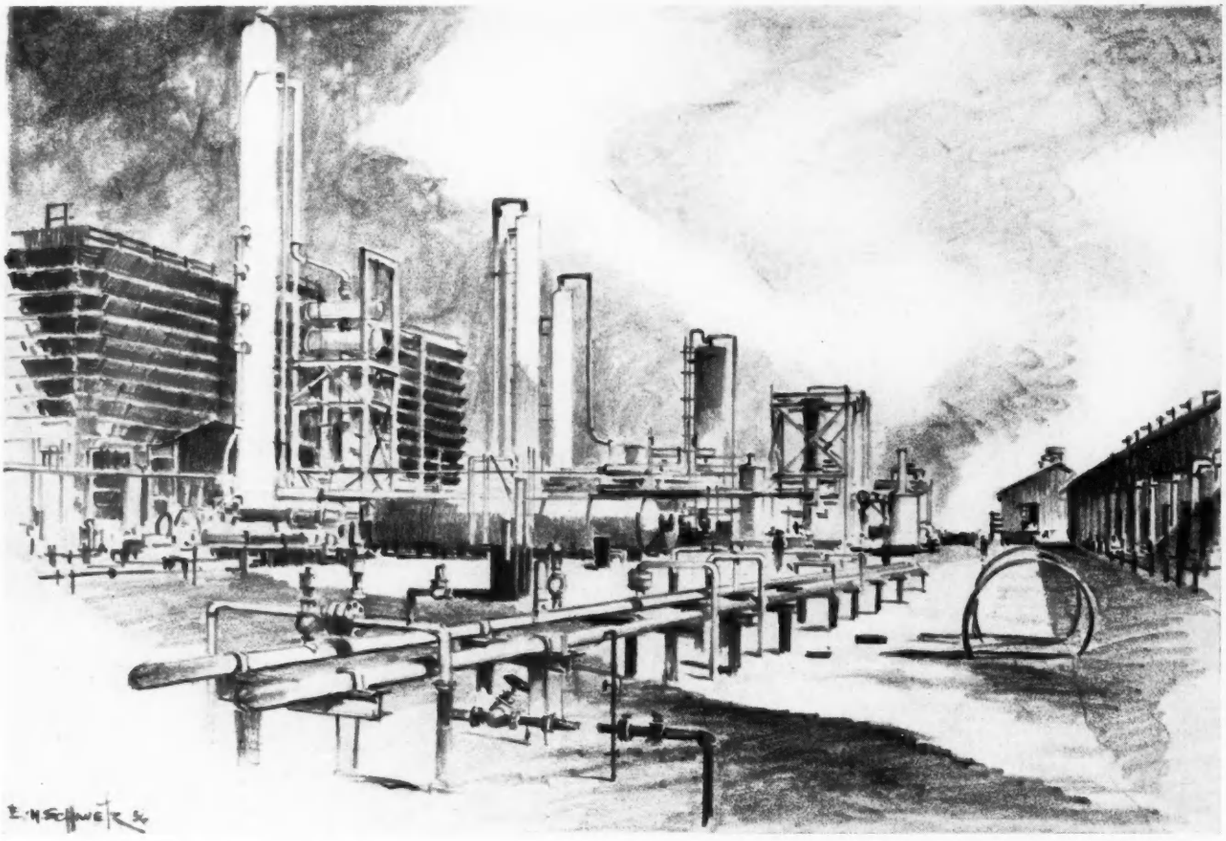
FOOTE Brothers No. 26 SO Reduction Unit



DREADNAUGHT Unitized Drawworks



TRANSIT Horizontal Duplex *Totally* enclosed 10" Stroke Power Pump, disassembled



NATURAL GASOLINE PLANT, GULF COAST OF TEXAS — *From a lithograph by E. M. Schiwetz*

THE FIRST NATIONAL BANK in Houston extends a greeting to visitors to the International Petroleum Exposition at Tulsa. Located in the oil capital, not only of Texas but of the nation, the First National is well acquainted with the banking needs of oil men and has developed complete banking facilities for their service.

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

FIFTY-SIX YEARS OF Thermoid PRODUCTS & SERVICE

As a major source for many key products universally used on oil equipment machinery, the Thermoid factory should be of special interest to oil field men everywhere. It is, of course, impossible to give here an adequate picture of twenty-seven acres of buildings, affording over 450,000 square feet of factory floor space. Nor can a few words convey the story of Thermoid's fifty-six years of business progress, resulting in its present position of leadership.

This growth can best be visualized by comparing in the illustration above Thermoid's original small factory with the present plant. Space does not permit showing, moreover, three large Thermoid subsidiaries — the Thermoid Textile Company, the Woven Steel Hose and Rubber Company, and the Southern Asbestos Company, located at Charlotte, N. C.

In the Trenton plant alone, Thermoid employs over 1500 people, many of them trained from youth. Their pride in their craftsmanship has contributed much in achieving the fine reputation of Thermoid products for uniform excellence.

During 1935, keeping pace with modern trends, Thermoid re-invested over $300,000 in new equipment and plant expansion, in addition to spending over $150,000 for factory maintenance. That should be sufficient indication of Thermoid's faith in the future and its confidence in the important role it will play in the future of the industry.

Thermoid products, designed for oil field equipment, include Rotary Hose, Air, Steam, Welding and Refinery Hose, Brake Linings and Packings.

OIL WELL SUPPLY COMPANY

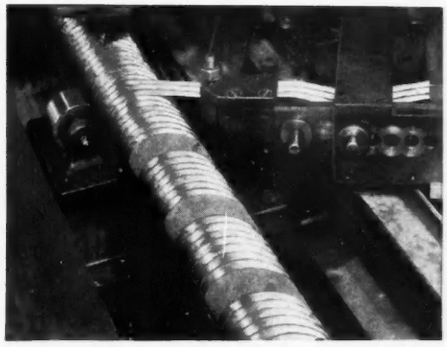
Branch Stores in All Oil Fields

DISTRIBUTORS OF

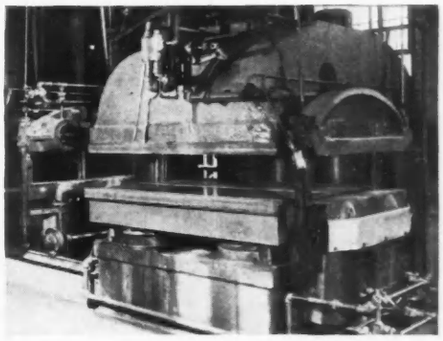
Thermoid

PRODUCTS FOR THE OIL INDUSTRY

★ ★ ★



An example of Thermoid's manufacturing progress is this Rotary Hose Wire Winder, which assures absolute precision in workmanship and greatly prolonged product life.

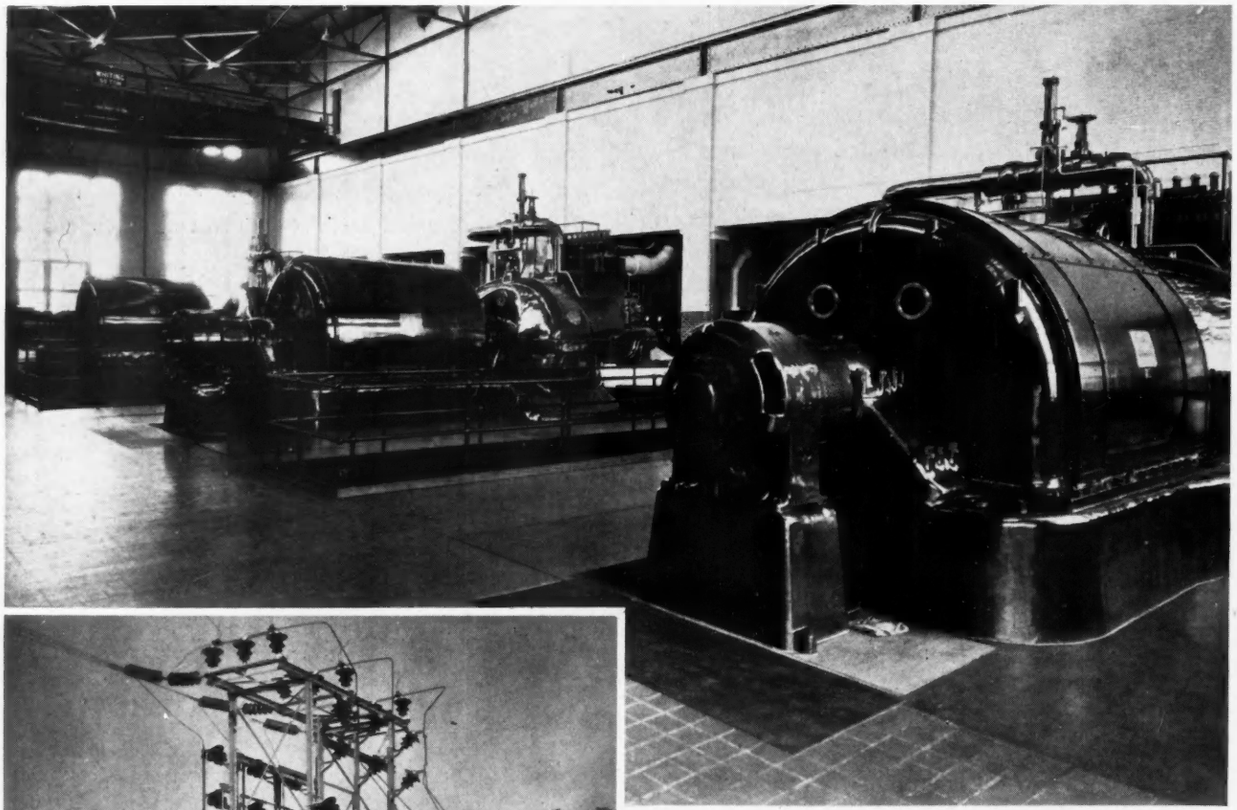


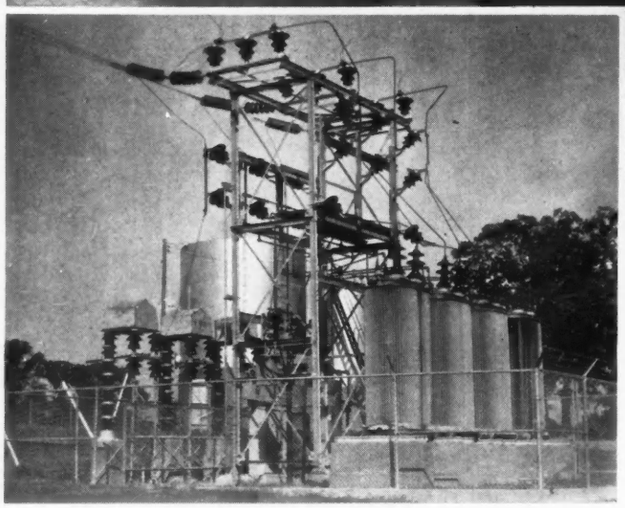
Here is one of the special gooseneck belting presses, installed by Thermoid to further improve the manufacture of oil field belting.

The Oil Industry Turns to PURCHASED ELECTRIC

PURCHASED Electric Power offers the only way for the oil man to shift the responsibility to other shoulders for the flexibility and dependability of his power supply.

And the oil man, having demonstrated his ability as an executive through the extraordinary success of his industry, seldom does anything himself that he can hire done. His time and energy are too valuable.





Power Companies everywhere spare no expense in the installation and maintenance of equipment which guarantee dependable service from Purchased Electric Power

Left—a typical field transformer station.

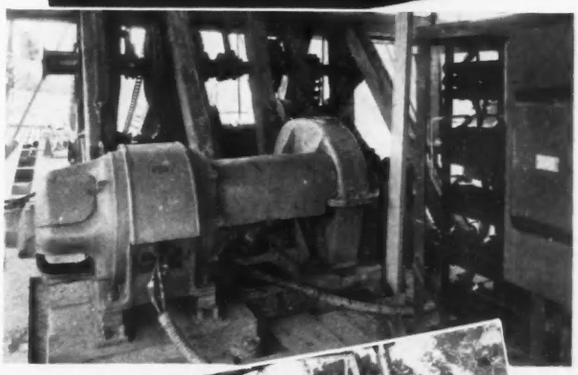
POWER . . . .

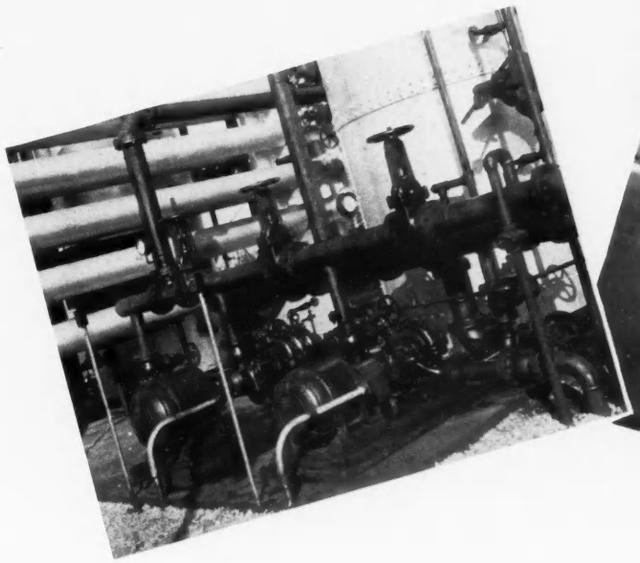
He would find it impossible to shift his power problems to broader, more willing, more responsible shoulders.

Unlimited power reserves are maintained for your convenience and protection. Days and nights, week days and holidays, in good weather and bad, an army of trained men manages and patrols the vast system of generators, hi-lines and transformer stations to see that motors do not falter and that lights do not fail.

And the old expensive habit of now and then assuming that Purchased Electric Power would not be the right thing for any given job is now obsolete, made so by the fact that many economies and pertinent facts are disclosed in unexpected quarters by the X-Ray mind of the modern engineer.

Your Power Company has able engineers who will give you every co-operation in determining when, where, and how to apply Purchased Electric Power to your advantage.





Spang Set the Pace

— AND MAINTAINS IT — IN THE MANUFACTURE OF HEAT-TREATED CABLE TOOLS

FOR 40 years Spang and Company have been leaders in solving Cable Tool Drilling problems.

Back in the Cooperstown, Pennsylvania, excitement the late George A. Spang started building Fishing Tools to meet the needs of the day. Keeping abreast with modern methods and pioneering in the field of fully heat-treated tools, today, more than 40 years later, Spang and Company are the leaders in serving the drilling contractor with Cable Tools of the Higher Standard.

They have given him the first Nickel Steel Combination Socket; the first Nickel Steel Full Circle Slip Socket; the famous Spang Weldless Jar, the only Jar made which has no welds; a Wire Line Knife that cuts; a Trip Spear that is positive and simple in operation; Twisted Bits that drill faster and keep the hole straighter; Packers that will pack almost any condition.

This equipment, with other Spang Quality Tools, will be shown at the Spang Booth in the California Building of the International Petroleum Exposition.

Officers and sales representatives of Spang and Company will be there and will be glad to meet you.

PERSONNEL OF SPANG AND COMPANY, BUTLER, PA.

Top, left to right: Loyal B. Spang, Vice President; Ferd J. Spang, President; C. Everette Spang, Vice President.
Bottom, left to right: E. B. Irvan, in charge of Michigan sales; George A. Lidderdale, manager of Michigan Branch; Olin B. Pierce, in charge of Texas sales; Lewis F. Porter, in charge of Kansas sales; C. J. Turner, in charge of Eastern sales.

Productivity Index

[*Continued from page 130*]

ductivity index. As in the case of the wells in the Keokuk pool, the productivity index defined as the rate divided by the square root of the pressure differential increases with rate of production, and the productivity index defined as the rate divided by the three halves' power of the pressure differential decreases with rate of production.

Other Wells Tested

Table 3 gives data obtained on three wells in the South Burbank pool, of Osage County, Oklahoma. The pressure differential plotted against rate of production is shown in Figure 4. It will be noted that the pressure differential is a straight-line function of the rate of production, thus yielding a constant productivity index. It will be noted that, at the higher rates of production, the straight-line relationship does not hold. However, this is of no particular concern, as it is the lower rates that it is desired to establish the productivity index.

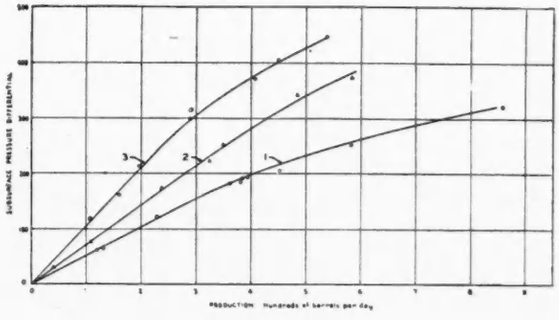


FIGURE 4

South Burbank Pool, Osage County, Okla.
1—Well F. 2—Well G. 3—Well H.

TABLE 3

Flowing Tests on Wells in the South Burbank Pool, Osage County, Oklahoma

(POUNDS PER SQUARE INCH)		BARRELS PER DAY	
Sub-surface Pressure	Pressure Differential	Rate of Oil Production	Pressure Differential
WELL F			
842	61	120	1.97
838	65	130	2.00
750	121	228	1.88
719	184	362	1.97
718	185	382	2.06
710	193	385	2.00
709	194	394	2.03
697	206	453	2.20
650	253	583	2.30
582	321	858	2.68
WELL G			
748	118	107	0.91
705	161	160	0.99
652	214	196	0.92
566	300	288	0.96
494	372	407	1.09
461	405	450	1.11
420	446	539	1.21
WELL H			
868	30	40.6	1.35
821	77	108	1.40
724	174	238	1.37
674	224	324	1.45
646	252	349	1.39
556	342	485	1.42
524	374	583	1.56

Some of the other data obtained on flowing tests, similar to those described above, have been of various types. For example, a number of tests conducted on wells in the Keokuk pool yielded increasing productivity indices with rate of production, while other wells in the same pool yielded decreasing indices. Still other wells yielded increasing, then decreasing indices, with rate of production. It does not seem plausible that such data are consistent. From a study of the data obtained so far, it would appear that the productivity index is a constant with rate of production; and that the discrepancies noted above are due to observational errors, either in gauging the production, or in determining the pressure, or both. In many instances, where the productivity index shows increasing or decreasing tendencies when calculated for each rate of production, a straight-line interpretation can be made of the pressure differential plotted against rate of production, indicating a constant value for the index.

The advantages of the productivity index over other potential tests are:

1. It is a better measure of the ability of the formation to yield oil.
2. It is not necessary to produce the well at high rates to establish the productivity index, thus eliminating the hazard of damaging the well due to premature water encroachment.

TABLE 2

Flowing Tests on Wells in the Lucien Pool, Noble County, Oklahoma

Sub-surface Pressure (Lbs. per Sq. In.)	Pressure Differential (Lbs. per Sq. In.)	Rate of Oil Production (Barrels per Day)	BARRELS PER DAY		
			Pressure Differential	(Pressure Differential) 1/2	(Pressure Differential) 3/2
WELL C					
,825	0	0	0	.....	.....
1,710	200	115	1.73	18.7	0.179
1,615	510	210	2.43	35.2	0.167
1,410	960	415	2.32	47.0	0.117
1,195	1,500	630	2.38	59.5	0.095
WELL D					
1,800	0	0	.....	.....	.....
1,685	195	115	1.69	17.8	0.153
1,515	535	285	1.88	32.2	0.117
1,325	960	475	2.02	44.0	0.992
1,110	1,507	690	2.18	57.2	0.084
WELL E					
1,845	0	0	0	.....	.....
1,805	150	40	3.78	23.8	0.595
1,727	515	118	4.37	47.4	0.501
1,645	975	200	4.87	68.8	0.344
1,525	1,590	320	4.98	89.3	0.279

3. It eliminates the waste occasioned by open-flow potentials.
4. It eliminates expensive, over-size equipment.

The disadvantages of the productivity index are:

1. It has not been definitely established that it is a constant with rate of production; and, therefore, some confusion exists as to just what is the productivity index.
2. Special equipment and trained men are necessary to establish it.
3. It is difficult to determine in wells which flow by heads, or are being produced by artificial means.

It is the writer's opinion that the use of productivity index has advantages that far outweigh the disadvantages. Much has been learned in the past year or two concerning the relationship between bottom-hole pressure and rate of production; and, with continued study, it seems almost certain that it will soon be entirely practical satisfactorily to determine the productivity index of a well, and to use such indices in the allocation of production. The productiv-produce be a factor in allocation. Such ability to produce oil and, therefore, will not conflict with the laws of states requiring that the well's ability to produce be a factor in allocation. Such ability to produce need not be on open-flow potential.

BIBLIOGRAPHY

[1] T. V. Moore, *Proc. A.P.I.* **11 (IV)** *27* (1930).
[2] Stanley Herold, *Petroleum World* **32 [6]** 48 (1935).

Application of Multi-Cylinder Gas Engines

[*Continued from page 120*]

power. The factors entering into such a determination are many and complex. The most obvious costs of gas-engine operation are maintenance, oil, repairs, fuel and depreciation.

Maintenance costs vary with the personnel available and the method adopted. Cost data were obtained on multi-cylinder engines ranging in size from 9 horsepower to 18 horsepower, rated upon 50-pound b.m.e.p. and 750-feet-per-minute piston speed, and loaded from 2 horsepower to the maximum of the rating in pumping service. These costs are apparently independent of the size of the engine or the load imposed upon it. Figures vary from $0.09 to $2.37 per day per engine among the different operators.

Repairs generally result from failure of the engine accessories rather than in the engine itself. Operators rate trouble from the ignition system first, with fan-belt trouble second. Failures result from inadequacy of parts, improper maintenance, or natural wear. Average costs of repair parts vary from $0.03 to $0.70 per day per engine.

Fuel costs are dependent upon the load on the engine and the value of fuel gas to the operator. As the load on an engine decreases, the fuel requirement per brake-horsepower hour greatly increases. For the part-load conditions under which gas engines generally operate in the oil field, the fuel consumption per horsepower is generally considerably in excess of that shown for full load. Seventeen cubic feet of 1000 B.t.u. gas per brake-horsepower hour is thought to be representative of average requirements. The value of gas to the operator is what he has to pay for it if he has to purchase it. If he produces his own gas, it should be valued at whatever he could secure for it if he should sell it. If there is no market for the gas, it should not be charged.

Figure 6 presents the annual cost of gas-engine power under continuous operation for different values of gas. The curves are based upon the values in Table 1.

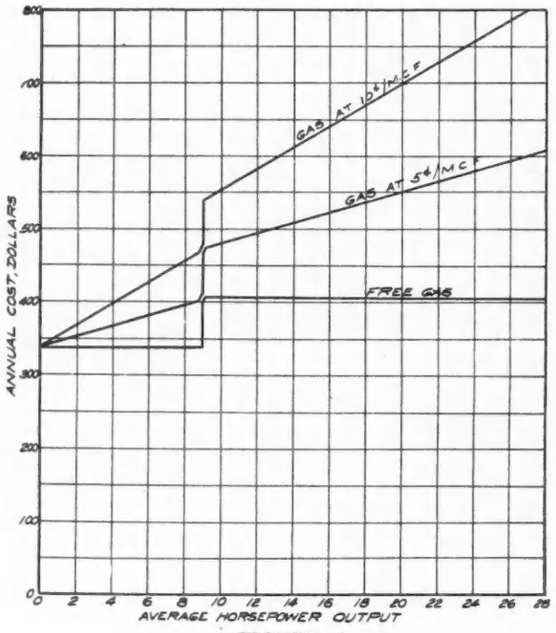


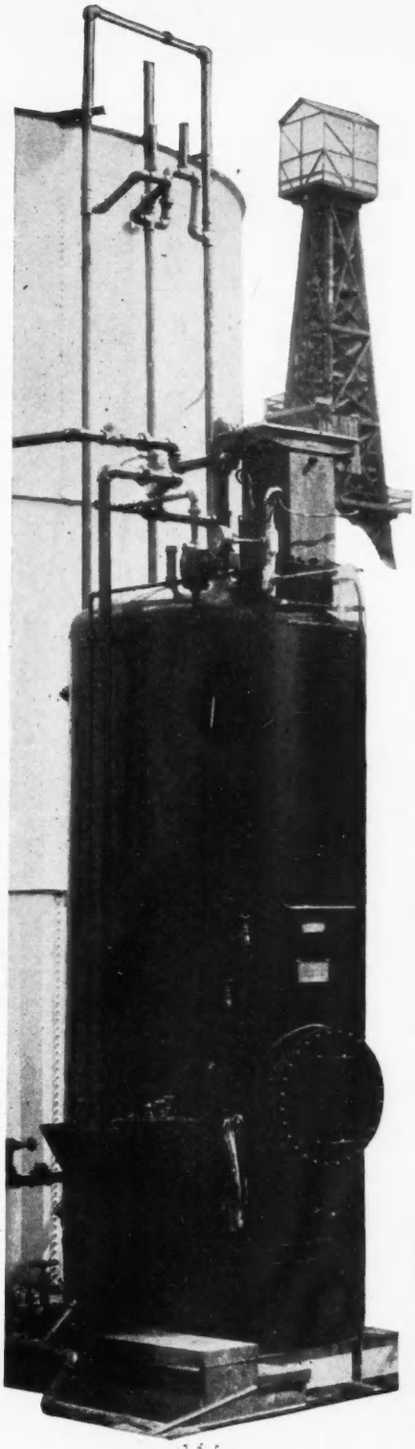
FIGURE 6
Annual Cost, Gas-Engine Power.

TABLE 1
Cost of Gas Engine Power

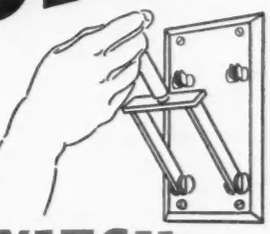
Expense Item	Amount
Maintenance and repairs	$0.47 per day
Oil	$0.13 per day
Depreciation	4 years—up to 9 hp. 5 years—above 9 hp.
Interest, taxes, insurance	9 percent
Efficiency	15 percent

It is seen that for any installation the cost of power is dependent upon conditions at that place. In addition to the above, there are other factors harder to evaluate, which must be considered in arriving at the probable cost of engine operation. Some of these are: availability of repair-parts stock, availability of personnel to make repairs, and equipment already on hand.

The problems of the application of multi-cylinder gas engines are far from solved. In the belief that these problems could best be met through the concerted efforts of the operators and the engine manufacturers, a multi-cylinder gas-engine committee was formed in Southern California, of which S. H. Grinnell (of Union Oil Company) is chairman. This paper is an attempt to set forth the findings of that committee to date. Appreciation is due all the members of that committee for the whole-hearted manner in which they have made available their data upon this subject.



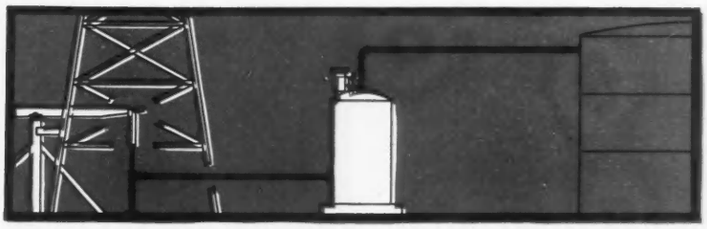
Produce PIPE LINE OIL Merely by THROWING A SWITCH



The production of any well can be changed instantly from "cut" oil to clean oil merely by switching on the electric current, when Petreco Electroflow Dehydration is utilized.

This method provides a direct line for the "cut" oil — from the well, through the dehydrator, to dry stock. The emulsified production flows directly through the dehydrator after leaving the well head, just as it would flow through a gas trap. When it leaves the dehydrator it is pipe-line oil, ready for clean oil storage. Treating is easier, more economical; results are better; there is less waste, and minimum losses. Savings due to the elimination of wet oil storage tanks frequently are sufficient to cover the entire cost of installation.

Petreco engineers will be glad to demonstrate the applicability of Petreco Electroflow Dehydration to your own cut oil problem without obligation.



A Direct Line—From The Well, Through The Dehydrator, To Dry Stock

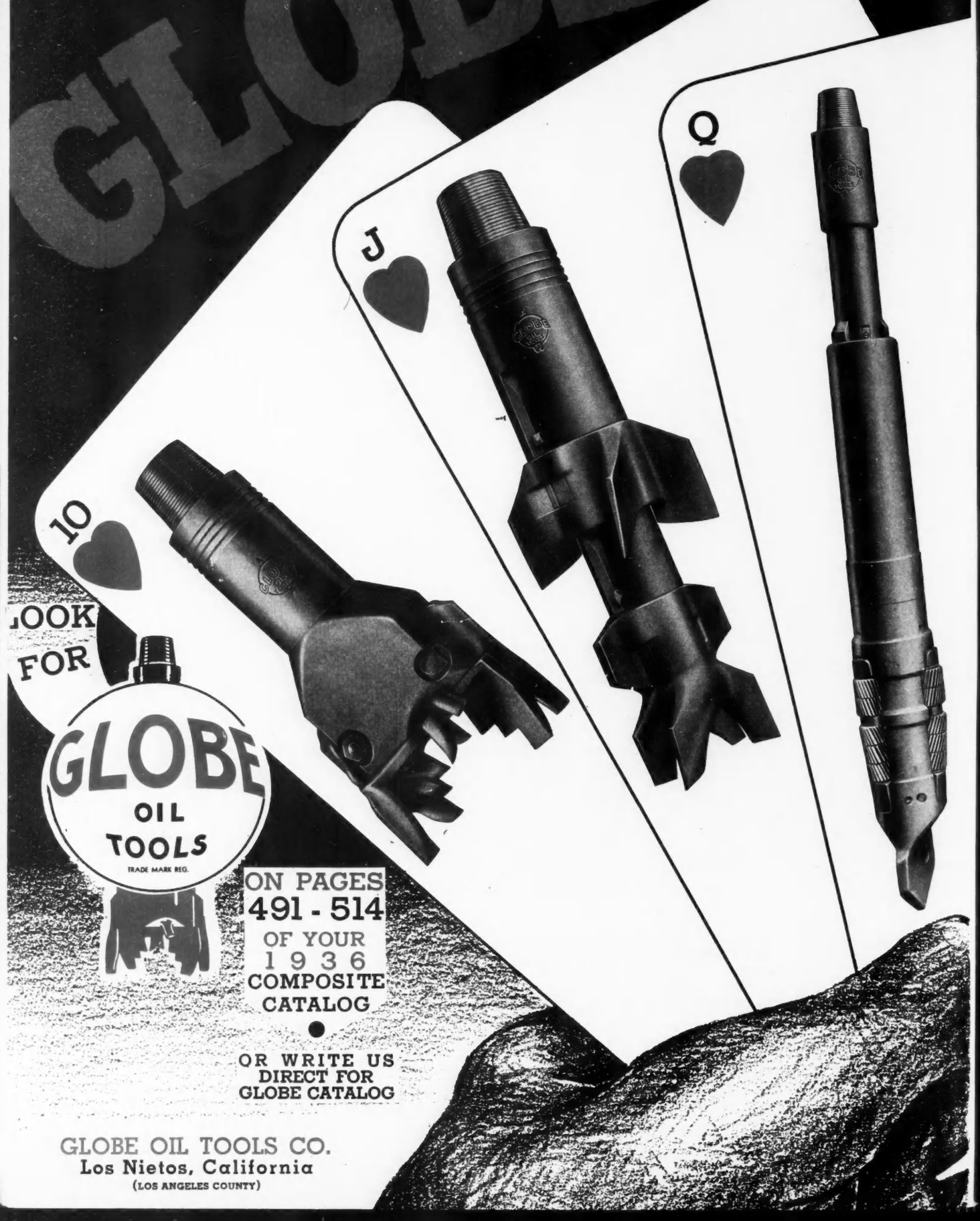
PETRECO

ELECTROFLOW DEHYDRATION

PETROLEUM RECTIFYING COMPANY OF CALIFORNIA

General Offices: 530 West Sixth Street, Los Angeles, California. Branch Office: Houston, Texas. Branches and Service Men In Principal Oil Fields.

Let GLOBE DEAL



LOOK FOR

GLOBE OIL TOOLS
TRADE MARK REG.

ON PAGES
491 - 514
OF YOUR
1936
COMPOSITE
CATALOG

●

OR WRITE US
DIRECT FOR
GLOBE CATALOG

GLOBE OIL TOOLS CO.
Los Nietos, California
(LOS ANGELES COUNTY)

YOU THIS HAND!

These safe, strong tools will help you secure lower costs and greater satisfaction in your drilling and coring operations. All have been proved by actual field use and are ready to do their part, whether your well is a mile from our plant, or in far-distant fields where continued, economical performance must be your "standard" for selection.

Read the brief descriptions below, then refer to your 1936 Composite Catalog, or write us direct for special information.

10 The Globe B-3 Bit—since 1927—has been the leader for drilling straight hole in a wide variety of formations. The "stepped" teeth cut a short core which helps in drilling straight hole; and eliminate "diamond pointing." Six reaming edges maintain full-gauge hole. No weight or side thrust is placed upon bolts. Replaceable molybdenum steel heads may be repeatedly rebuilt.

J A Globe Re-Drill Bit with diamond-point pilot bit is used for reaming out rat hole made with a core barrel or a small bit. Or it may be equipped with a Globe M-5 Bit to provide a successful "tandem-type" drilling unit. Both the Re-Drill Cutter and the Bit are held in place by our patented lock, and are changed without using tongs or bit breaker and without removing shank from drill collar.

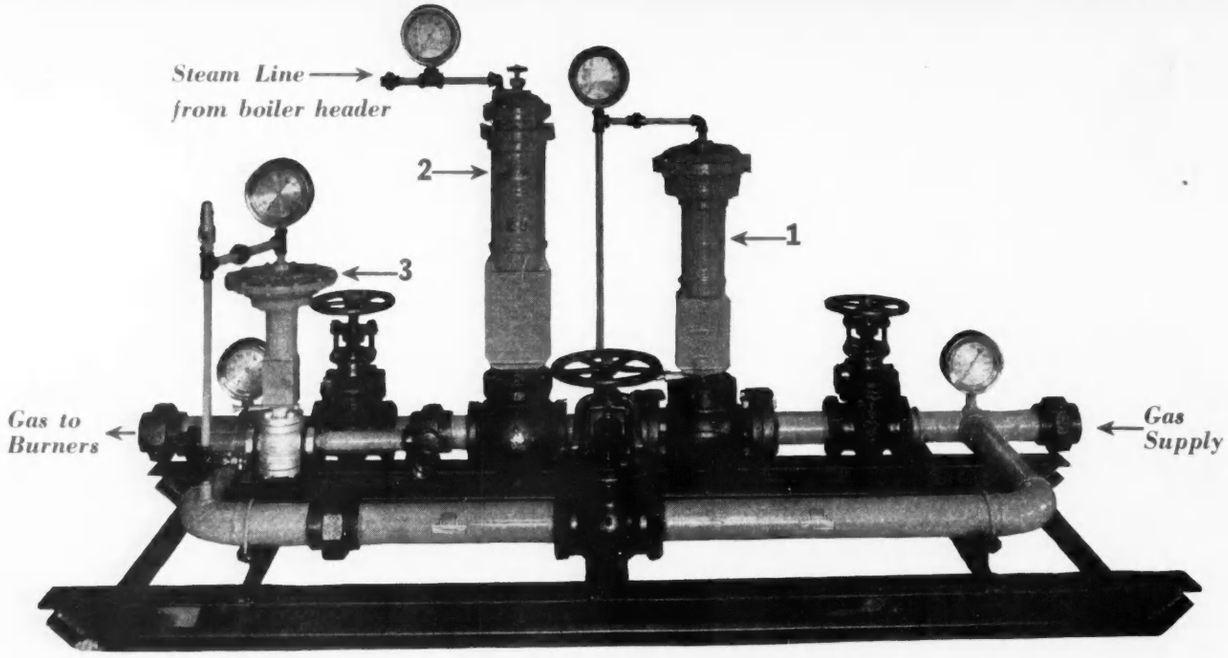
Q Strong, simple design and positive expansion combine to make the Globe Rotary Underreamer safe and profitable for enlarging the hole (a) to set pipe easily; (b) to secure water shut-off; (c) to set larger liner without turning down couplings; and other important uses. The cutters are expanded by a positive, mechanical wedging action and successfully ream and maintain full-gauge hole.

K The Globe Roller Bearing Rock Core Bit provides a "double-duty" outfit which takes cores from the hardest formations, or from soft and broken formations, by simply changing heads. Roller bearing cutters with deep-cut, sharp teeth take hard formation cores, which are readily pulled by a catcher which contains both slips and dogs. Cutters are easily changed, without welding. Soft Formation Heads are readily re-built and are provided with positive, cam-actuated dog-type core catchers. The "floating" threadless Inner Barrel stands still with the core, and high core recovery and low costs are assured.

A Here is a "fishing" bit which quickly and safely recovers from bottom all metal junk ranging in size from bolts, parts of bits and steel splinters up to slips and pipe couplings. Narrow tapered teeth guide the "fish" to center where they pass upward through a double, dog-type core catcher. Small junk is carried into the barrel on top of a short, large diameter core; larger "fish" are usually gripped by the dogs in the core catcher—and in either case positive, fast recovery is a simple operation.

MANY OTHER MODERN AND EFFICIENT GLOBE TOOLS ARE DESCRIBED IN YOUR COMPOSITE CATALOG; OR IN THE GLOBE CATALOG WHICH WILL BE SENT GLADLY UPON REQUEST OF ANY OIL MAN.

"MECO"
UNITIZED FIRING CONTROL
FOR OIL FIELD BOILERS



PROVEN EFFICIENT AND ECONOMICAL IN THE FIELD—
Now On Display at the Tulsa Show

A complete unit that controls your boiler steam pressure . . . first, by reducing and keeping constant your fuel gas pressure; secondly, by controlling the flow of this gas to your burners; and finally, by creating proper draft when needed. All valves are diaphram actuated, totally enclosed, floating on stainless steel ball bearings. Check the picture with the following points and you'll readily see the advantages of this popular "MECO" Unit:

1 Mason-Neilan
REDUCING VALVE:

Permits you to select the most efficient pressure for your burner regardless of high or varying fuel gas line pressure. Pressure adjustments easily made, but protected from inexperienced hands.

2 Mason-Neilan
BOILER PRESSURE CONTROLLER:

Automatically regulates the flow of gas to your burners in accordance with steam demands. Quick, smooth reaction to the slightest boiler pressure change.

3 Mason-Neilan
STACK BLOWER CONTROL:

Automatically provides increased draft when needed. Stops steam waste on idle firing. Eliminates cooling of boiler from unnecessary excess air on low loads.

These complete units are built for any pressure boiler or any number of boilers to the battery. You will profit by investigating the set-up operating in National Supply Company's outside exhibit at the Tulsa Show, or any of the many field installations now in use.

Complete detailed information furnished upon request.

MAINTENANCE ENGINEERING CORPORATION
1400 Conti Phone Preston 6338 L. D. 409
HOUSTON, TEXAS

Some Improvement

GASOLINE MARKET SLIGHTLY STRONGER AS DEMAND RISES

STIMULATED by more favorable weather for motoring and farm activities, the oil industry's markets are tending to forge ahead to firmer ground. In the early part of the past week there was continued weakness of the markets for both gasoline and kerosene. But as the week progressed, better demand for gasoline began to be reflected in more stable tank car prices, although there was not much change in the kerosene situation.

The improvement in the gasoline market was evidenced also by the posting of higher service-station prices on the regular and premium grades of motor fuel in the Chicago metropolitan area. The major companies on May 13 and May 14 raised those prices ½-cent a gallon. That was the second half-cent increase in the area within the past month. Including state and federal taxes, the new retail prices are 17½ cents for the regular grade and 19½ cents for Ethyl. Last week's revision also advanced the tank-wagon price of regular grade ½-cent, or to 15½ cents, while the tank wagon price of Ethyl was left unchanged at 18 cents. There was not any change in the service-station or tank-wagon prices of third-grade gasoline.

East Texas Situation

The more favorable weather increased demand sufficiently to result in some tightening of the supplies of third-grade gasoline in East Texas as well as in other refining districts of the Mid-Continent. Early in the week there were reports of available supplies of fully tenderable third-grade in East Texas at 4⅜ to 4¾ cents a gallon, but it was indicated that only limited quantities could be bought for less than the 4⅞-cent price that was being paid by the major-company buying pool. Nevertheless, the underselling had resulted by the latter part of the week in lowering of the top price from the 4⅞ cents to 4¾ cents. In the meantime, truck movements of third-grade gasoline out of East Texas were going at 3½ to 4 cents a gallon, with the prices somewhat depressed by those offered by plants using hot oil. There has not been any material change lately in the East Texas refined oil situation, on the whole. Similarly, the hot oil situation there has remained about the same. It is estimated currently that the volume of hot oil is ranging between 11,000 and 15,000 barrels daily.

Mid-Continent Prices

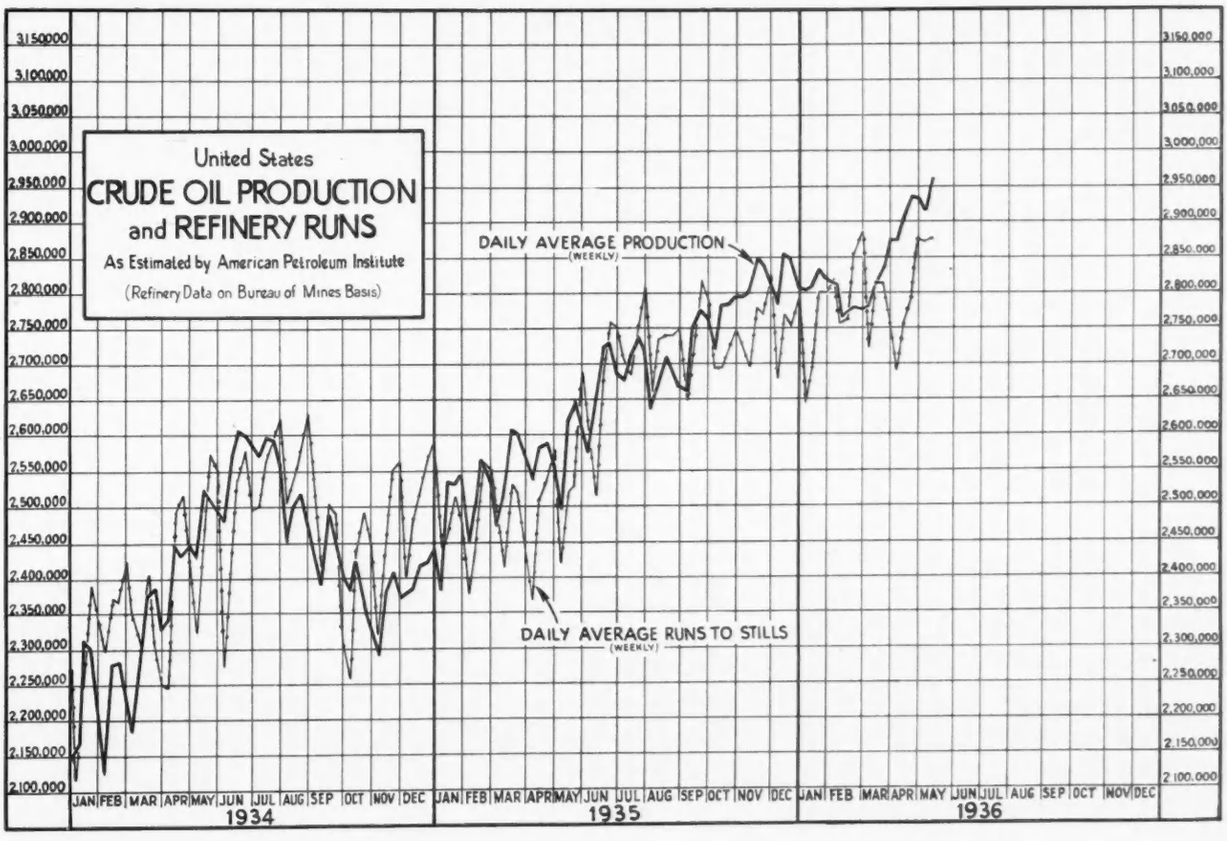
In the Chicago area, too, third-grade was priced in some instances as low as 4¾ cents, although the range was upward to 5⅛ cents. At Oklahoma refineries third grade, 62 octane and below, was within a range of 4⅞ to 5¼ cents a gallon.

The unusually low octane gasoline made from Rodessa crude has continued an unsettling factor. That material was offered last week for as little as 4¼ cents a gallon f.o.b. Shreveport.

U. S. Motor gasoline of 63 to 70 octane rating was priced last week at 5½ to 5¾ cents a gallon f.o.b. Oklahoma refineries and at 5⅛ to 5¾ cents in the Chicago area on a Group Three freight basis. The 68-70 octane gasoline was 6 to 6¼ cents at the Oklahoma refineries and 5¾ to 6⅛ cents in the Chicago market.

Kerosene Market Weak

Kerosene tank car prices in the Mid-Continent late last week continued somewhat weaker than in the previous week, although there were some hopes that the better weather would bring an improvement in demand and a strengthening of prices. The 41-43 water white kerosene



was priced f.o.b. Oklahoma refineries at 4⅛ to 4⅜ cents a gallon, the minimum quotation being an eighth-cent lower than a week previously. The same grade was down definitely an eighth-cent in the Chicago market at 4 to 4¼ cents. In East Texas the price was 4⅜ cents. The 42-44 water white kerosene was priced in the Oklahoma market at 4⅜ to 4½ cents, and in the Chicago market at 4¼ to 4½ cents, having undergone no change from the previous week.

Gasoline Stocks Down Little

An important factor back of recent weakness in the gasoline tank car market has been the unusually large quantity in storage, and slowness in making the usual seasonal reductions in the inventories. Some encouragement was offered, however, by the latest weekly report of the American Petroleum Institute. That report showed that during the week ended May 9 the stocks of finished and unfinished gasoline, as reported to the organization, were reduced 217,000 barrels. That reduction was effected despite a further increase in crude runs to a daily average of 2,691,000 barrels.

Crude Production High

The market picture has not been improved any, however, by the current status of crude oil production, and there is at present very little talk indicating hopes of any immediate improvement in crude postings. The latest report of the Bureau of Mines on crude stocks showed that during the week ended May 2 the nation's stocks increased 1,060,000 barrels to a total of 314,192,000 barrels. The American Petroleum Institute's latest report on crude production showed that in the week ended May 9 the output was up 43,250 barrels from the previous week in averaging 2,961,700 barrels daily. It was stated that this rate of production was within 3700 barrels of the all-time peak as reported by the Institute for the week ended September 14, 1929.

The May allowables as fixed in some of the leading oil producing states are higher than the recommendations of the Bureau of Mines, and consequently the nation's crude output this month, as in April, is likely to be substantially above the market demand.

Rodessa Threatening Again

The Rodessa field, which for some months has caused considerable anxiety, was threatening last week to give rise to an immediate rupture in the markets. Under the special order issued by a Louisiana state official some weeks ago, a producing company in the field last week was taking from its wells more than 1000 barrels daily per well, in contrast with the regular allowables of 350 barrels daily per well. That situation was threatening to cause a general breakdown of proration at Rodessa, and an accompanying break in the markets in the Mid-Continent.

Decline of one eighth cent per gallon in the East Texas gasoline market the past week confronts the law-abiding plant owners with an economic problem. The price break, occurring in the latter part of the week, lowered the top quotation on U. S. motor fuel qualified for interstate deliveries to 4¾ cents per gallon. This affords a very nominal margin of profit for the efficient plants that conform with regulations of the federal tender board, as a premium in the form of a crude delivery charge is paid by a number of the refineries that are not adequately fortified with controlled production.

Legally produced crude delivered into the plant is costing some of the operators $1.22½ cents per barrel, including 7½ cents delivery costs exacted by producers that have facilities to gather their own production. Majors have contracted for large quantities of crude from private gathering systems at 5 to 7½ cents per barrel above the posted price delivered to purchasers field stations, and this competition forces the independent refiner to do likewise in buying tendered crude.

The volume of illicit crude production for the field is currently estimated at 11,000 barrels daily. Plants providing market for this excess production are receiving from 3½ to 4 cents per gallon for gasoline sold for disposal within the state by tank trucks.

East Texas Tank Car Shipments

Week Ending May 10, 1936

PRODUCTS	No. Cars	Estimated Gallons
Gasoline	531	4,316,133
Fuel Oil	286	2,748,079
Casinghead Gasoline	214	1,780,044
Distillate	57	456,831
Kerosene	24	188,065
Gas Oil	14	113,439
Residuum	9	72,732
Naphtha	3	22,597
Crude Oil	1	10,025
Total	1,139	9,707,945
Total Previous Week	1,186	10,007,375
Interstate	416	.....
Intrastate	399	.....
Coastwise	324	.....
Total	1,139	.....

SEEK INJUNCTION

Against gas proration in Texas Panhandle

Austin, Texas.—Cities Service Gas Company has filed suit in Federal Court at Austin seeking to enjoin the order of the Texas Railroad Commission prorating gas in the Panhandle.

Allegations in the petition filed are similar to those in a suit brought by the Canadian River Gas Company which resulted in an injunction against the order.

Cities Service Company owns its own wells and pipe line and contends that the railroad commission has exceeded its powers through the order, which would require the company to purchase gas from other operators when that gas might be produced from its own wells without waste.

Since these larger Panhandle producers are able to supply their needs with approximately seven percent of their daily production, they can hardly be charged with excessive withdrawals, it was alleged.

Summary of Wells Completed in the United States Week Ending May 16, 1936

	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total Completions 1936	Total Completions this date 1935
Alabama	....	....	....	....	.....	2	3
Arkansas	3	1	....	2	228	34	71
California	21	21	....	....	14,112	336	295
Colorado	....	....	....	....	.....	5	5
Illinois	....	....	....	....	.....	4	8
Indiana	....	....	....	....	.....	87	78
Kansas	25	17	3	5	18,602	553	547
Kentucky	7	2	2	3	22	92	58
Louisiana	33	23	8	2	39,905	387	279
Michigan	19	12	2	5	1,930	262	152
Mississippi	....	....	....	....	.....	2	9
Montana	6	6	....	....	370	40	25
New Mexico	11	9	....	2	8,154	183	106
New York	....	....	....	....	.....	....	....
Ohio	26	11	12	3	246	732	531
Oklahoma	74	53	5	16	66,208	996	897
Pennsylvania	....	....	....	....	.....	....	57
Texas	285	192	6	87	235,480	4,514	4,473
Utah	....	....	....	....	.....	....	....
West Virginia	9	3	6	....	4	262	188
Wyoming	....	....	....	....	.....	16	17
Total this week	519	350	44	125	385,261	8,506	7,780
Total last week	480	298	53	129	.....	....	....
Total this year	8,506	5,634	865	2,007	8,119,432	....	....

Comparison of Permits Granted for New Wells

STATE	Week Ending May 16	Total this Mo.	Total this Year	Total this Date Last Year	1935 Year Total
Arkansas	1	7	34	57	70
California	24	64	349	364	925
Louisiana	13	58	443	338	846
Kansas	36	125	684	547	1,204
Michigan	19	54	240	194	749
Oklahoma	69	216	868	878	2,311
Texas	274	937	5,112	5,130	10,800
Total	436	1,456	8,007	7,508	16,964

ALL TIME RECORD

United States crude output soars to new high

UNITED STATES crude oil production established a new all-time peak rec-record during the past week, ended May 16. The output for the period averaged 2,993,425 barrels daily, according to the regular estimates compiled by THE OIL WEEKLY. The previous peak, as reported by the American Petroleum Institute, was set in the week ended September 14, 1929, when production averaged 2,965,400 barrels daily.

Last week's production was 61,850 barrels a day higher than that in the previous week, and 167,125 barrels per day above the average recommended for May by the United States Bureau of Mines.

Four Leaders Show Gains

The increase of production over the previous week's level was the result of larger output in four of the five leading producing states: Texas, Louisiana, Oklahoma, and Kansas, while the other of the big five, California, showed a slight decrease.

Texas production last week averaged 1,169,900 barrels daily, or about 11,000 barrels a day more than in the previous week. The Bureau of Mines allocation to Texas for May was 1,132,500 barrels daily. Consequently, the state showed last week an excess of 37,400 barrels daily. However, the Texas Railroad Commission last week ordered reductions of allowables in the state effective May 20, in an emergency order, indicating that the state's output will be more nearly in line with demand in the latter one-third of the month.

Oklahoma and Kansas Up

Oklahoma last week averaged 560,525 barrels production per day, which was 22,700 barrels a day more than in the previous week, and 22,225 barrels per day more than federal allocation.

Kansas output averaged 160,500 barrels daily. It was 5300 barrels a day more than in the previous week and 10,400 barrels a day more than the Bureau of Mines estimate of demand.

Rodessa Causes Increase

Louisiana showed a further substantial increase in production last week, when Rodessa output jumped upward under the special allowables enjoyed by certain wells. The state's production rose approximately 11,000 barrels, to a new average of 225,850 barrels daily. Although the Louisiana Gulf Coast district declined to 145,600 barrels daily from 146,200 barrels, the North Louisiana production jumped to 80,250 barrels daily from 68,600 barrels a day, with Rodessa almost wholly responsible for the increase.

California production last week was down to 578,000 barrels a day from 583,500 barrels daily the previous week, a 5500-barrel decline. As the state's quota for May on the federal schedule was 544,000 barrels daily, the output last week was 34,000 barrels a day above the allocation.

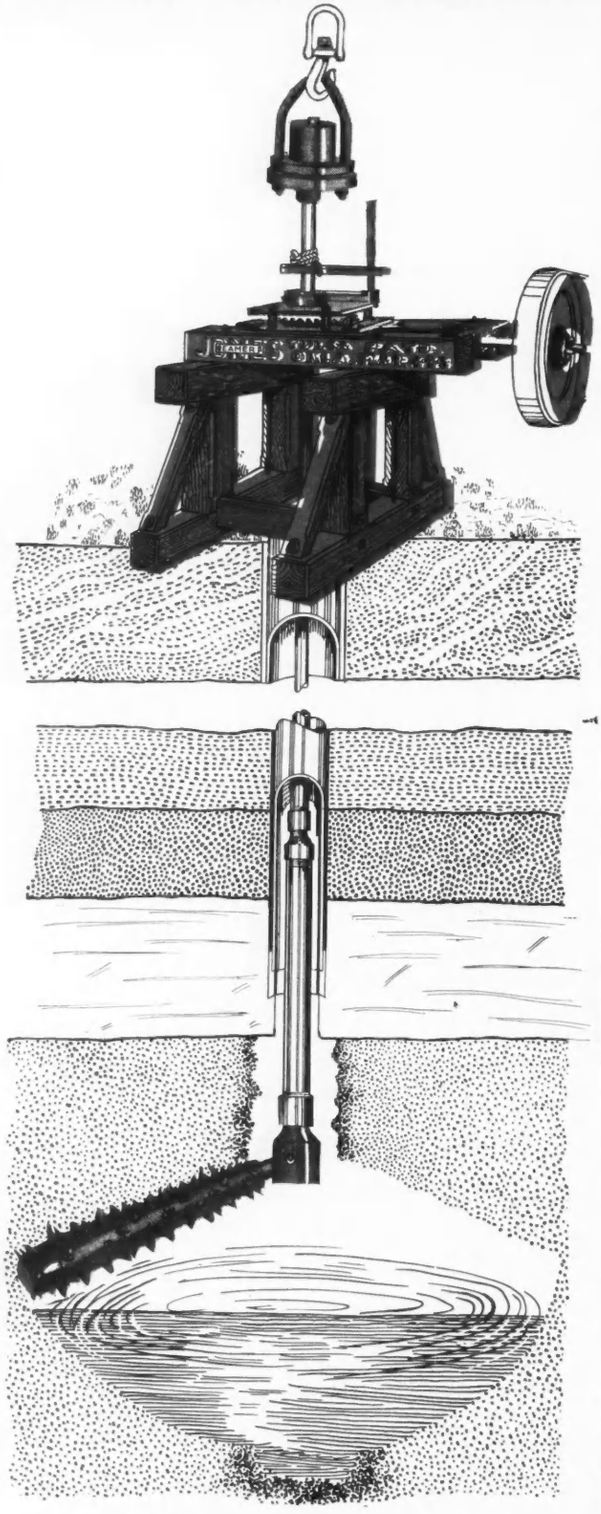
United States Crude Oil Production

Estimates Compiled by THE OIL WEEKLY

DISTRICT OR STATE	BARRELS DAILY FOR WEEK ENDING May 16	May 9
TEXAS—		
Texas Panhandle	62,200	64,300
North Texas	59,600	59,500
West Central Texas	25,000	25,000
West Texas	185,200	181,200
East Central Texas	53,100	50,600
*East Texas Field	451,100	448,100
†South Texas	81,300	80,700
†Texas Gulf Coast	252,400	247,600
*Total Texas	1,169,900	1,157,000
OKLAHOMA—		
Oklahoma City	155,400	127,950
Seminole Area	146,850	140,550
Tatums	3,550	3,500
Lucien	13,650	13,500
Fitts	43,025	54,625
Edmond	12,625	10,925
Others	185,425	186,775
Total Oklahoma	560,525	537,825
KANSAS—		
Ritz-Canton	6,700	6,725
Voshell	3,175	3,325
Nikkel-Hollow	4,175	4,625
Sedgwick	5,700	5,725
Burrton-Haury	13,400	14,100
Lorraine	7,250	6,475
Oxford	7,500	7,650
Others	112,600	106,575
Total Kansas	160,500	155,300
LOUISIANA—		
North Louisiana	80,250	68,600
Louisiana Gulf Coast	145,600	146,200
Total Louisiana	225,850	214,800
ARKANSAS	30,050	29,950
CALIFORNIA—		
Long Beach	68,000	68,200
Santa Fe Springs	44,200	45,100
Huntington Beach	37,500	36,300
Dominguez	25,400	24,800
Inglewood	13,200	12,100
Ventura Avenue	34,000	33,100
Seal Beach	9,700	9,600
Midway-Sunset	56,600	60,000
Elwood	13,000	12,600
Kettleman Hills	79,600	79,900
Mountain View	27,600	27,600
Playa del Rey	13,700	14,100
Others	155,500	160,100
Total California	578,000	583,500
MOUNTAIN STATES—		
Wyoming	38,200	35,700
Montana	13,300	10,400
Colorado	4,600	4,300
Total Rocky Mountain States	56,100	50,400
NEW MEXICO	72,400	63,600
EASTERN STATES	105,500	105,800
MICHIGAN	34,600	33,500
*Total United States	2,993,425	2,931,575
*Surreptitiously produced oil in East Texas, not included in above figures, estimated at	15,000	15,000
Grand Total, including surreptitious production	3,008,425	2,946,575

† Coastal Section of South Texas is included with Texas Gulf Coast.

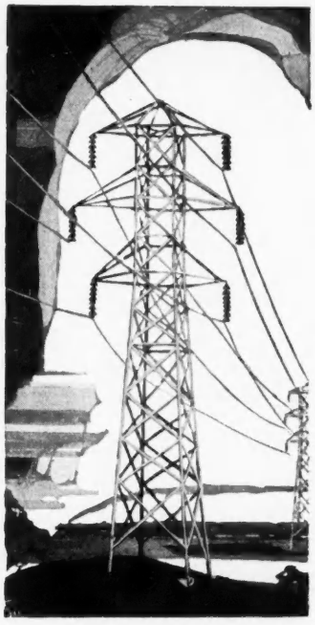
INCREASE YOUR PRODUCTION



The Jones Oil Well Reamer gets more oil. Used successfully in most every oil sand in the United States. Most successful companies used this oil well reamer for more production. Removes more paraffin and other obstruction and makes larger seepage area. See the most successful chemical oil well cleaner in America.

Write or Wire for Particulars.

THE JONES OIL WELL REAMER COMPANY
Independence, Kansas



WHEN
EVERYTHING
is taken into consideration

ELECTRIC POWER

is proven to be the most economical, flexible and safe

●

GULF STATES
UTILITIES COMPANY

General Offices:

BEAUMONT, TEXAS LAKE CHARLES, LA.

Crude Runs to Stills: Stocks of Finished and Unfinished Gasoline and Gas and Fuel Oil, and Cracked Gasoline Production, Week Ended May 9, 1936

(Figures in thousands of barrels of 42 gallons each as reported to American Petroleum Institute.)

DISTRICT	Daily Refining Capacity			Crude Runs to Stills		Stocks of Finished and Unfinished Gasoline				Stocks of Gas and Fuel Oil			Daily Charging Capacity of Cracking Units			Cracked Gasoline Production
		Reporting				Finished								Reporting		
	Potential Rate	Total	%	Daily Average	% Operated	At Refineries	Terms. Trans. Pipe Lines	Unfinished in Naphtha Distillates	Total Finished and Unfinished	Gas Oil & Distillate	Residual Fuel Oil	Total	Potential Rate	Total	%	Daily Average
East Coast	612	612	100.0	494	80.7	7,642	11,784	1,020	20,446	3,174	4,518	7,692	534	534	100.0	106
Appalachian	154	146	94.8	97	66.4	1,460	988	250	2,698	224	213	437	79	78	98.7	23
Ind., Ill., Ky	442	424	95.9	400	94.3	7,636	2,691	943	11,270	1,287	1,770	3,057	349	348	99.7	123
Okla., Kans., Mo	453	384	84.8	287	74.7	4,551	2,353	684	7,588	516	2,071	2,587	256	228	89.1	66
Inland Texas	330	160	48.5	99	61.9	1,251	116	228	1,595	267	1,406	1,673	148	105	70.9	26
Texas Gulf	680	658	96.8	596	90.6	6,040	272	2,012	8,324	2,996	3,426	6,422	399	393	78.5	153
Louisiana Gulf	169	163	96.4	124	76.1	1,184	401	191	1,776	944	1,044	1,988	77	74	96.1	22
North La.,—Ark	80	72	90.0	50	69.4	221	87	109	417	42	334	376	46	44	95.7	9
Rocky Mountain	97	60	61.9	41	68.3	1,453	.....	103	1,556	133	601	734	46	39	84.8	10
California	852	789	92.6	503	63.8	9,417	2,478	1,056	12,951	.....	.....	71,313	280	280	100.0	68
Reported	.....	3,468	89.6	2,691	77.6	40,855	21,170	6,596	68,621	.....	.....	96,279	.....	2,123	95.9	606
Estimated Unreported	.....	401	....	179	....	2,728	1,807	333	4,868	.....	.....	2,271	.....	91	....	44
*Estimated Total U.S. May 9, 1936	3,869	3,869	....	2,870	....	43,583	22,977	6,929	73,489	.....	.....	98,550	2,214	2,214	....	650
*Estimated Total U.S. May 2, 1936	3,869	3,869	....	2,875	....	44,003	22,702	7,001	73,706	.....	.....	97,073	2,214	2,214	....	630
U.S.B. of M.,May,1935	.....	....	....	2,594	....	†34,725	†20,471	†6,287	†61,483	.....	.....	†100,177	.....	....	....	559

*Bureau of Mines basis currently estimated. †As of May 31, 1935.

Contradictory

[*Continued from page 38*]

"It has been demonstrated to the satisfaction of those informed about this important phase of our national life that only through a balanced program of supply and demand can we most economically produce from our petroleum reserves. As a part of such a balanced program, the limitation of imports must have a place."

Criticising the apparent inclination of the State Department to place more importance upon the protests of foreign governments than to the support of domestic industries, Disney pointed out that both France and The Netherlands impose their own tariff and trade restrictions on importations from this country, particularly with respect to petroleum products.

The French protest was based on representations that imposition of the tax on bunker oil would cost one French steamship company approximately $500,000 a year, which the congressman intimated might not be borne out by the facts. The Netherlands protest was based on the possibility that the interests of duties oil companies might be affected by restrictions on imports; Disney, however, pointed out that The Netherlands government is commonly identified with an oil company which has entered this country and has been accorded a free market here. "It has even become one of the most important distributors of petroleum products in this country," he commented. "No American company has secured similar privileges from The Netherlands government."

Under the Disney Bill, the present excise taxes on imported oil and its products would be doubled, the exemption now granted bunker oil would be eliminated, and imports would be restricted to not exceeding 4½ percent of the demand for domestic consumption and export.

Texas Reduced

[*Continued from page 43*]

given to understand a 10 percent cut in the Texas allowable and the allowable for other Mid-Continent fields would mean a price increase. Whether the reduction ordered by the Texas Railroad Commission which applied only to proratable oil would lead to the raise predicted, could not be ascertained.

East Texas took about a 10,000-barrel cut, and commission engineers estimated that the allowable on May 20 would be 438,000 barrels per day. This will allow operators to produce 2.6 percent of the hourly potential of their wells, instead of 2.78 percent of the hourly potential as now allowed. This is the second cut ordered for East Texas within the past three weeks. The allowable having been reduced on May 1 from 2.85 percent to 2.78 percent of the hourly potential. Most of the other districts received cuts, as compared with the order issued which became effective May 1.

SOUTH TEXAS CUT

Austin, Texas.—The Texas Railroad Commission has issued an order effective May 8 reducing allowables in seven Southwest Texas fields by approximately 3600 barrels daily. The order issued was based on evidence taken at a hearing held on May 7 at which Magnolia Petroleum Company presented an application seeking to have a cut of 5000 barrels ordered for these fields.

While the purpose of the order was to effect a cut of approximately 5000 barrels a careful check of the order in effect on May 7 and that of May 8 indicates that only 3600 barrels were subtracted.

The entire reduction was effected by cutting the top allowable of each field. Since proration in all of the fields affected is on the per-well basis, those wells with the highest potential suffered most of the reduction. The North Government Wells field was reduced 690 barrels to 10,738 barrels. South Government Wells was reduced 376 barrels to 5479 barrels. This was effected by reducing the top allowable from 40 to 35 barrels per day.

A 30-barrel top allowable was fixed for Bruni, Lopez, O'Hern, Loma Novia, and Seven Sisters. All of these fields except Bruni had a 35-barrel top and the top allowable in Bruni was 40 barrels. The effect of this order was to cut Seven Sisters 845 barrels to 4650 barrels. Lopez was reduced 505 barrels to 3300 barrels; Bruni was reduced 454 barrels to 1497 barrels; and O'Hern was cut 490 barrels to 2940 barrels.

CRUDE OIL PRICE QUOTATIONS

(Figures Represent Basic or Flat Prices—Revised to May 15, 1936)

DISTRICT	Low Grav.	Dif.	High Grav.	Date
Oklahoma-Kansas	28—$0.94	2¢	40—$1.18	1- 9-36
N. and N.-C. Texas	28— .84	2¢	40— 1.08	1- 9-36
Texas Panhandle				
Gray County	34— .86	2¢	40— .98	1- 9-36
Carson-Hutchinson	34— .81	2¢	40— .93	1- 9-36
West Texas				
Ector, Pecos, W'kler Crane, Upton, Howard and Glasscock	29— .76	2¢	36— .90	1-14-36
West Central Texas	28— .84	2¢	40— 1.08	1- 9-36
East Central Texas	28— .91	2¢	40— 1.15	1- 9-36
East Texas	*1.15			1- 9-36
Talco	* .60			4-15-36
Texas Gulf Coast				
Anahuac-Dickinson	30— 1.04	2¢	40— 1.24	1- 9-36
Conroe	35— 1.24	2¢	40— 1.34	1- 9-36
Tomball	*1.30			1- 9-36
Cleveland	*1.00			1-11-34
†Goose Creek, Hull Liberty, Orange, Pierce Junction, Moss Bluff, Racecon Bend, Sour Lake, Spindletop, Sugarland, West Columbia, Humble, Rabbs Ridge	Below 17— .88	2¢	34— 1.22	1- 9-36
South and S. W. Texas	Below			
Refugio (Light)	17— .88	2¢	34— 1.22	1- 9-36
Refugio (Heavy)	* .90			1- 9-36
Saxet	* .90			1- 9-36
Mirando	* .85			1- 9-36
Pettus	*1.25			1- 9-36
Salt Flat	* .97			1-14-36
Darst Creek	* .97			1-14-36
Port Lavaca	* .97			
Plymouth	* .90			12-17-35
Arkansas				
El Dorado (Light) and Rainbow	25— .78	2¢	40— 1.10	1-10-36
El Dorado East Field and Smackover	* .75			1-10-36

* All gravities—flat rate.
† Gulf Coast prices as posted by Humble Oil & Refining Company.

DISTRICT	Low Grav.	Dif.	High Grav.	Date
North Louisiana	25—$0.78	2¢	40—$1.10	1-10-36
Urania	* .97			1-10-36
South Louisiana	Below			
Lockport	19— .92	2¢	34— 1.22	1- 9-36
Iowa, Cameron Mds.	Below 19— .82	2¢	34— 1.12	1- 9-36
Rocky Mountain States				
Salt Creek	29— .94	2¢	40— 1.18	1-10-36
Elk Basin	*1.28			1- 9-36
Grass Creek (Light)	*1.28			1- 9-36
Grass Creek (Heavy)	* .58			1- 9-36
Big Muddy	*1.11			1- 9-36
Rock Creek	*1.12			1- 9-36
Sunburst	*1.25			1- 9-36
Lance Creek	* .90			1- 9-36
Osage	*1.08			
Cat Creek	*1.07			8-25-33
Cut Bank	*1.45			9-29-33
Pondera	*1.05			9-29-33
Hog Back, N. M.	*1.00			9- 8-33
Lea County, N. M.	* .75			9-29-33
Mid-West States				
Lima	*1.25			1-10-36
Illinois	*1.23			1- 9-36
Princeton	*1.23			1- 9-36
Western Kentucky	*1.23			1- 9-36
Pennsylvania				
Bradford	*2.45			1-13-36
Sw. Pa. Pipe Line	*2.17			1-13-36
Eureka Pipe Line	*2.12			1-13-36
Buckeye Pipe Line	*1.97			1-13-36
Corning Grade	*1.42			1-13-36
Michigan				
Central Michigan	*1.32			1-14-36
Muskegon	* .70-1.00			12-31-32
Canada				
Petrolia	*2.10			9- 9-33
Oil Springs	*2.17			9- 9-33

* All gravities—flat rate.
‡ Average price, all oil sales being to small refineries.

MAJOR PRICE CHANGES

	Penna. (Nat. Tr.)	Mid.-Cont. (36 Gr.)	Calif. (26 Gr.)
June 19, 1933	Up 10	Up 10	.....
June 26, 1933	Up 10	.....	Up 9-12
July 6, 1933	Up 12	Up 10	.....
July 17, 1933	Up 15	.....	.....
July 28, 1933	Up 15	.....	.....
August 11, 1933	Up 10	.....	.....
August 24, 1933	.....	Up 10	.....
August 30, 1933	Up 15	.....	.....
September 6, 1933	Up 10	Up 10	Up 15
September 8, 1933	.....	Up 15	.....
May 1, 1934	Up 10	.....	.....
November 6, 1934	Cut 25	.....	.....
December 6, 1934	Cut 25	.....	.....
January 4, 1935	Up 15	.....	.....
February 4, 1935	Up 15	.....	.....
May 16, 1935	Cut 15	.....	.....
June 26, 1935	Cut 15	.....	.....
July 16, 1935	Cut 10	.....	.....
August 29, 1935	.....	.....	Cut '4'
September 6, 1935	Up 5	.....	.....
October 29, 1935	Up 15	.....	.....
November 1, 1935	.....	.....	Up °28
November 18, 1935	Up 15	.....	.....
December 6, 1935	.....	.....	Up °9
January 9, 1936	.....	Up 10	.....
January 13, 1936	Up 15	.....	.....
February 26, 1936	.....	.....	Up '5

CRUDE PRODUCTION TAXES

Oklahoma—Five percent of gross value less royalty interest.

Texas—Two cents or 2 percent, whichever is higher.

Louisiana—From four to 11 cents a barrel, depending upon gravity.

Arkansas—2.6 percent of gross market values.

Montana—Two percent of gross value at well and ¾ of 1c per barrel.

Wyoming and New Mexico—Production tax based upon state and county assessments.

California—.66443 mills per barrel of oil produced and 17.39 cents per acre on proved oil lands.

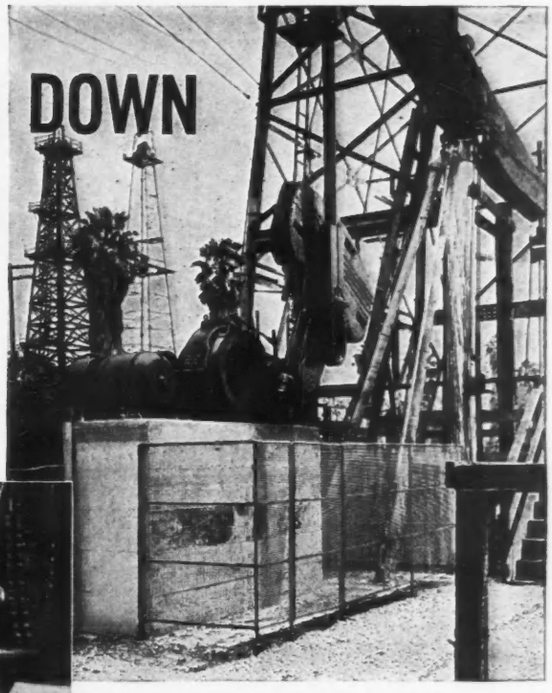
* All gravities—flat rate.
° Signal Hill 26 gravity.
' Seal Beach 26 gravity.

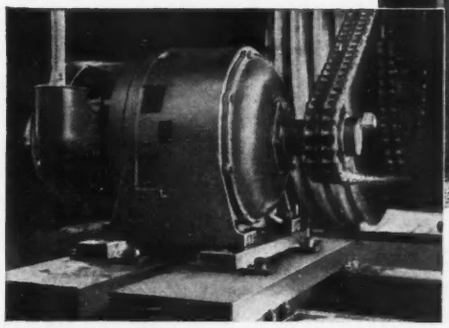
CALIFORNIA OIL PRICES

(All gravities above those quoted take highest prices of that field. Effective February 26, 1936)

Gravity	Signal Hill	Seal Beach Alamitos Heights	Huntington Beach	Inglewood	Playa Del Rey	Olinda Brea Canyon	Athens Rosecrans	Elwood Terrace	Torrance	Richfield	Whittier East Coyote La Habra	Montebello	West Coyote Hills	Santa Fe Springs	New Hall McKittrick Kern River Round Mountain	Mountain View	Midway-Sunset Buena Vista Hills	Lost Hills	Coalinga	Wheeler Ridge
14-14.9	$.80	$.79	$.78	$.79	$.80	$.76	.....	.....	$.80	$.76	$.76	$.77	$.78	.....	$.70	.....	$.70	$.70	$.70	.....
15-15.9	.80	.79	.78	.79	.80	.76	.....	.....	.80	.76	.76	.77	.78	.....	.70	.....	.70	.70	.70	.....
16-16.9	.80	.79	.78	.79	.80	.76	.....	.....	.80	.76	.76	.77	.78	.....	.70	.....	.70	.70	.70	.....
17-17.9	.80	.79	.78	.81	.80	.76	.....	.....	.80	.76	.76	.77	.78	.....	.70	.....	.70	.70	.70	.....
18-18.9	.80	.79	.78	.84	.80	.78	.....	.....	.82	.76	.76	.77	.78	.....	.70	.....	.70	.70	.70	.....
19-19.9	.82	.79	.82	.87	.84	.81	.....	.....	.85	.76	.78	.77	.78	.....	.70	$.70	.74	.74	.71	$ 70
20-20.9	.85	.79	.85	.90	.88	.84	.....	.....	.88	.78	.82	.77	.80	.....	.....	.70	.78	.78	.73	.70
21-21.9	.88	.79	.89	.93	.93	.88	.....	.....	.91	.80	.85	.77	.84	.78	.....	.73	.82	.82	.74	.70
22-22.9	.92	.82	.92	.96	.98	.92	.....	.....	.93	.84	.89	.79	.88	.78	.....	.77	.87	.86	.78	.72
23-23.9	.95	.86	.96	.99	1.02	.96	$.84	.....	.96	.88	.93	.82	.92	.78	.....	.80	.92	.90	.82	.76
24-24.9	.99	.91	1.00	1.02	1.06	.99	.88	.....	.99	.91	.96	.85	.96	.82	.....	.84	.97	.94	.86	.79
25-25.9	1.03	.95	1.08	1.05	1.11	1.03	.93	.....	1.02	.95	.....	.89	.99	.86	.....	.88	1.01	.98	.90	.83
26-26.9	1.06	1.00	1.07	1.09	1.16	1.06	.98	.....	1.05	.98	.....	.92	1.03	.90	.....	.91	1.06	1.02	.....	.....
27-27.9	1.10	1.05	1.11	1.12	.....	1.10	1.03	.....	.....	1.02	.....	.96	1.06	.95	.....	.95	1.10	1.06	.....	.....
28-28.9	1.14	1.10	1.14	1.15	.....	1.14	1.07	.....	.....	1.06	.....	.99	1.10	.9½	.....	.99	1.15	1.10	.....	.....
29-29.9	1.17	1.15	1.18	1.18	F.O.B.	1.17	1.12	.....	.....	1.09	.....	1.03	1.14	1.08	.....	1.02	1.20	1.14	.....	.....
30-30.9	1.21	1.19	1.22	1.21	Pipe	1.21	1.17	F.O.B.	.....	.....	.....	1.07	1.17	1.08	.....	1.06	1.25	1.18	.....	.....
31-31.9	.....	.....	.....	1.24	Line	1.24	1.22	Ship	Kettleman Hills			1.11	1.21	1.12	.....	1.09	1.29	.....	.....	.....
32-32.9	.....	.....	.....	1.27	.....	1.27	1.27	.....				1.14	1.25	1.16	.....	1.13	1.34	.....	.....	.....
33-33.9	.....	.....	.....	.....	.....	.....	1.32	$1.28		1.19		1.18	1.28	1.20	.....	1.17	1.38	.....	.....	.....
34-34.9	.....	.....	.....	.....	.....	.....	1.37	1.32	.....	1.23	.....	1.22	1.32	1.25	.....	1.20	.....	.....	.....	.....
35-35.9	.....	.....	.....	.....	.....	.....	1.42	1.35	.....	1.27	.....	1.25	.....	1.29	.....	.....	.....	.....	.....	.....
36-36.9	.....	.....	.....	.....	.....	.....	1.46	1.39	.....	1.31	.....	1.29	.....	1.33	.....	.....	.....	.....	.....	.....
37-37.9	.....	.....	.....	.....	.....	.....	1.51	1.43	.....	1.35	.....	1.32	.....	1.37	.....	.....	.....	.....	.....	.....
38-38.9	.....	.....	.....	.....	.....	.....	1.56	.....	.....	1.39	.....	1.36	.....	1.42	.....	.....	.....	.....	.....	.....
39-39.9	.....	.....	.....	.....	.....	.....	1.61	.....	.....	1.43	.....	1.40	.....	.....	.....	.....	.....	.....	.....	.....
40-40.9	.....	.....	.....	.....	.....	.....	1.66	.....	.....	.....	.....	1.43	.....	.....	.....	.....	.....	.....	.....	.....

WHEN PRESSURES GO DOWN WILL YOU BE ABLE TO PUMP AT A PROFIT?





G-E gear-motor, triple-rated, low-starting-current, squirrel-cage induction motor, chain-connected to beam pump in Oklahoma oil-field

G-E splashproof, squirrel-cage induction motor installed outdoors on well-pumping rig, Santa Fe Springs, Calif.

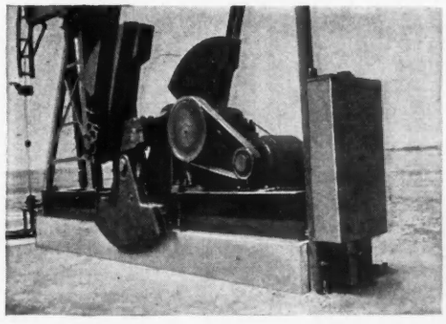
WHEN you equip your new wells, do so with an eye to the future, when pressures will be less, and it will therefore be necessary to pump continuously to supply the demand. Electric pump drives are the answer. Electric motors and matched control give long life, their maintenance cost is low, and, above all, they give you 24-hour availability when you need it.

The flow of power from electric drive is smooth; there are no pulsating power impulses on the sucker rods. G-E motors are built to deliver full rated load and will continue to operate even though overworked.

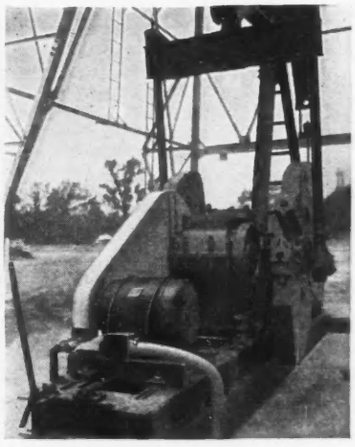
Many designs of G-E motors are available, according to your needs. Splashproof motors with weatherproof control can be operated outdoors, with no shelter necessary. Squirrel-cage constant-speed motors give you the advantages of low first cost, simple control, and a smooth flow of power. Double- or triple-rated motors give you the advantage of double or triple operation at maximum efficiency. Their higher ratings provide sufficient power to carry peak loads safely and economically. Gear-motors in all sizes are applicable to normal or low-speed pumping and make possible the reduced maintenance of slow pumping systems.

Where central-station power is not economically available on account of physical location, consider the combination of the internal-combustion engine and the G-E generator, which will give you cheap primary power for electric pumping.

The nearest G-E office will gladly give you complete information on the right electric equipment for your oil-well pumping systems. General Electric, Schenectady, New York.



G-E ball-bearing, high-torque splashproof induction motor, driving pumping unit in Texas Panhandle. Weatherproof control unit in the foreground



G-E triple-rated, ball-bearing motor, splashproof design, coupled to a Lufkin reduction-gear pumping unit in the East Texas oil field. Note the weatherproof terminal box in the foreground. Weatherproof control, not shown in the picture, includes automatic starting and stopping by a G-E time switch

020-241H

GENERAL ELECTRIC

3 Hours Faster

TRANSCONTINENTAL SCHEDULE
FOR THE NEWLY RE-CREATED

"SUNSET LIMITED"

ONE OF AMERICA'S FINEST TRAINS

Between New Orleans, Lake Charles, Beaumont, Houston, San Antonio, El Paso and California.

SUNSET LIMITED—fast through train to San Francisco, offers speed with safety and comfort.

Its Companion is the

"ARGONAUT"

Through To Los Angeles—Connecting with "Daylight," Arriving San Francisco 7:00 P.M.

Both Trains Completely Air-Conditioned

Most Modern Equipment—Through Standard and Tourist Sleepers, Diner, Lounge Car, Chair Cars and Coaches. Through Sleeper to San Diego on ARGONAUT.

	Sunset Limited	Argonaut
Lv. New Orleans	11:20 A.M.	11:00 P.M.
Ar. Lake Charles	5:01 P.M.	5:28 A.M.
Ar. Beaumont	6:24 P.M.	6:59 A.M.
Ar. Houston	8:20 P.M.	9:00 A.M.
Ar. San Antonio	2:00 A.M.	2:45 P.M.
Ar. El Paso (M.T.)	6:55 P.M.	8:45 A.M.
Ar. Los Angeles	5:00 P.M.	7:30 A.M.
Ar. San Francisco	8:10 A.M.	.....

Low Vacation Fares on sale daily to California, Pacific Northwest, Alaska, Mexico.

•

Texas Centennial Exposition—Dallas, June 6-Nov. 29.
Texas Frontier Centennial—Fort Worth, July 1-Nov. 29.

Ship via S.P.—Pick-up and Delivery Service

Southern Pacific

Texas Centennial Route

J. T. MONROE, *Passenger Traffic Manager*
Southern Pacific Bldg., HOUSTON, TEXAS

RODESSA DEAL

Between Standard and Gulf not yet completed

HOUSTON.

NEGOTIATIONS for purchase of half interest in Standard Oil Company of Louisiana holdings in Rodessa field by Gulf Oil Corporation probably will not be concluded by May 16, according to a statement by Walter Pyron, executive vice president of the latter organization.

Pyron amplified his statement by declaring it was not absolutely certain at this date that the deal would be consummated. He refused to discuss the consideration of $6,000,000 reported by the daily press as an approximate figure involved in transfer of half ownership in some 3500 acres at Rodessa recently acquired by Stanolind Oil Company.

Well informed sources have it that no negotiations as such are underway at this time, as the original purchase by Standard Oil Company of Louisiana was for the joint account of Gulf Oil Corporation, half and half, the former to operate the properties.

Standard Oil Company of Louisiana in Rodessa recently purchased from Haynes Production Company 3500 acres on which were located 34 oil wells and one gas well at time of purchase. While no consideration was announced in connection with the deal, Haynes Production Company is reputed to have turned down an offer of $15,000,000 for the property from Root Petroleum Company prior to closing with Standard Oil Company of Louisiana. The payment was to have been one third cash and the remainder in oil.

ROESER & PENDLETON

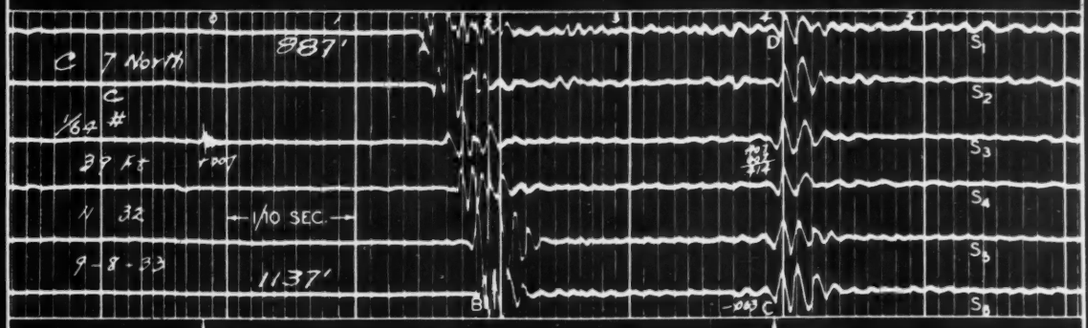
Sell East Texas holdings to Shreveport operators

Longview, Texas.—Roeser & Pendleton, Incorporated, Fort Worth, has contracted to sell its oil producing properties in East Texas field to R. G. Trippett and A. H. Meadows, Shreveport, for a consideration of $1,500,000, including a cash payment of $400,000 and $1,200,000 payable from one-half of the production interest held by the former in 11 leases. Contract was signed May 14, and the deal becomes effective upon approval of titles by the purchasers, who have organized and financed more than a score of companies that have production in the field.

The purchase price amounts to slightly more than $53,000 per well, as Roeser & Pendleton, Incorporated, held net interest in 29¾ wells and 221 acres of producing leases. The entire property consists of 65 producers on 490 acres with a gross allowable of 1357 barrels daily.

Immediately upon consummation of the purchase the Shreveport interests propose to drill approximately 30 wells to be distributed among the 11 tracts. A majority of the leases are situated in the thick sand section of northern Gregg County, and one is in Upshur County.

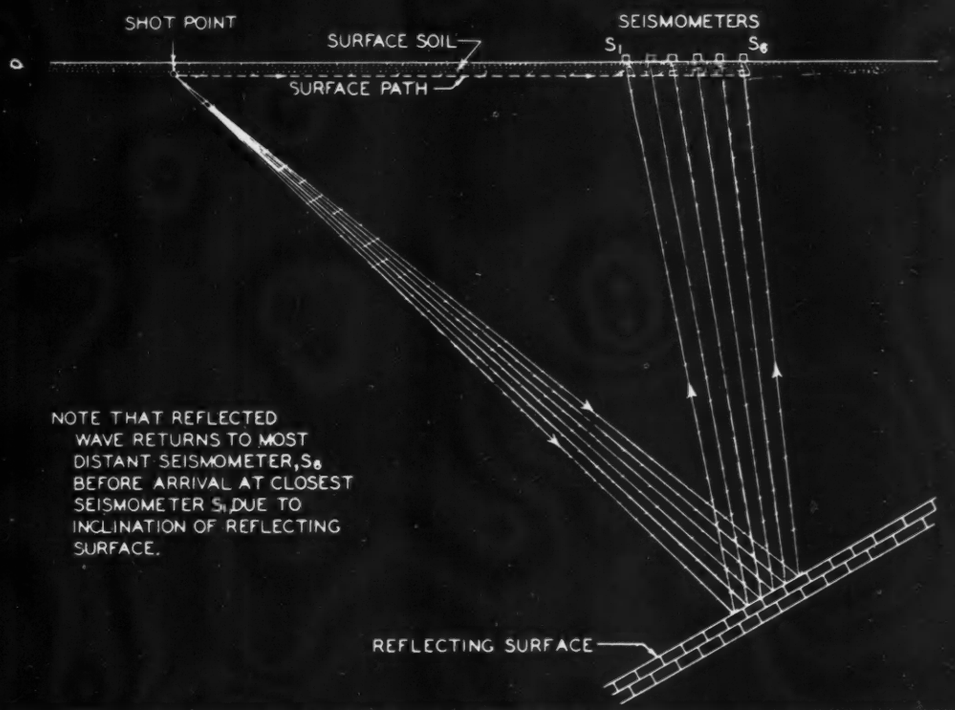
REFLECTION SEISMOGRAPH METHOD FOR DETERMINING DIRECTION OF INCLINATION IN BURIED STRATA

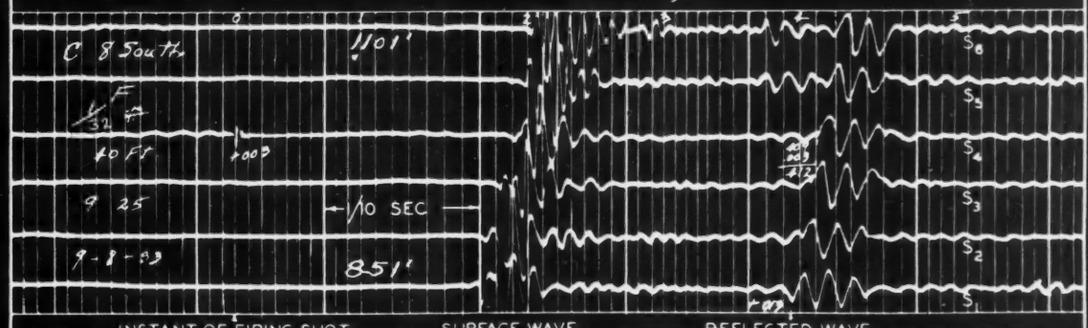


INSTANT OF FIRING SHOT — SURFACE WAVE — REFLECTED WAVE

SEISMIC RECORD ILLUSTRATED IN DRAWING BELOW

SHOT DOWN DIP FROM SEISMOMETERS


SHOT POINT
SURFACE SOIL
SEISMOMETERS
S1
S6
SURFACE PATH
NOTE THAT REFLECTED WAVE RETURNS TO MOST DISTANT SEISMOMETER, S6 BEFORE ARRIVAL AT CLOSEST SEISMOMETER S1 DUE TO INCLINATION OF REFLECTING SURFACE.
REFLECTING SURFACE



INSTANT OF FIRING SHOT — SURFACE WAVE — REFLECTED WAVE

SEISMOMETERS IN SAME POSITION AS ABOVE ILLUSTRATION BUT WITH SHOT UP DIP FROM SEISMOMETERS

NOTE THAT REFLECTION ARRIVES FIRST AT SEISMOMETER CLOSEST TO SHOT

GEOPHYSICAL SERVICE
DALLAS TEXAS
GSI

South Oklahoma

THREE WILDCAT TESTS STILL HOLDING INTEREST

WEEKLY STAFF REPORT

Ardmore.—Three south Oklahoma wildcat tests were still holding attention although one of them apparently is a dry hole, another has not yet reached a depth at which it can be checked on a known marker, and the other was drilling in the Simpson section with an unknown amount of formation to be penetrated before it can be considered a conclusive test. Sinclair Prairie Oil Company's Stockton 1, SE SE SW 26-6s-2w, 16 miles northwest of Marietta in northwestern Love County, cored from 8427 to 8438 feet, recovering 4 feet of dry lime and was coring ahead. Top of the Birdseye lime was reported at 8428 feet. At the present depth the test is the second deepest drilling operation in the Mid-Continent area. Five miles northeast of Marietta in the northeastern part of the county, Amerada Petroleum Corporation and Stanolind Oil & Gas Company's Westheimer 2, SW SE SW 27-6s-2e, had recovered by swabbing 240 barrels of the 437-barrel load which was placed when the hole was acidized with 5000 gallons several days ago. The casing had been perforated above 4800 feet. This test went to 7363 feet and penetrated more than 3800 feet of Simpson formation which yielded dips as high as 90 degrees in the cores, indicating that the bit was traveling along the bedding planes or almost parallel to them.

Approximately one mile west of the Simpson discovery well in the old Fox pool of northwestern Carter County, Gulf Oil Corporation's W. B. Johnson 1, C SW SW 28-2s-3w, was drilling below 4143 feet in limestone. It is scheduled to test the Simpson section from which the discovery well is producing at 8105 feet. In the southern part of the county Carter Oil Company's Vorhees 1, SE SW 34-5s-2w, an important wildcat test on a large block, was drilling below 3400 feet. No definite markers have yet been picked up.

Fitts Pool

Activity in the Fitts pool of southeastern Pontotoc County has been slow for the past week as official potential gauges were being taken for the next proration period. Seventeen wells in the west and southwestern parts of the pool are now making water ranging up to 60 per cent. Eight wells are cutting 10 percent or more, one is making as high as 60 percent and another 27 percent. Three of the water wells are in Section 25, 1 in Section 26, 9 in Section 36 all in 2n-6e, and 2 in Section 29 and 1 in Section 30-2n-7e. The water situation is one of considerable interest. Analysis shows it to be coming from below the producing horizons, evidently through minor faults which cannot be traced from the cutting studies.

In the eastern part of the pool, Blackstock Oil Company et al's Daniels 2, NW SE SW 21-2n-7e, topped Bromide formation at 4320 feet, drilled to 4360 feet and acidized with 5000 gallons, after which it produced 605 barrels in 5 hours through the tubing. It was then treated with an additional 10,000 gallons of acid and shut in. Stahl Petroleum Company's Dennis 5, SW SW SW 21-2n-7e, topped Hunton lime at 3540 feet and was drilling below 3765 feet apparently still in the lime. Blackstock Oil Company et al's Moody 2, SW SW SW 23-2n-7e, topped Hunton lime at 3472 feet and was drilling below 3482 feet. The same operator's Moody 1-A, NE NE NE 27-2n-7e, topped Hunton lime at 3396 feet, had Sylvan shale from 3750 to 3751 feet, the total depth and flowed 350 barrels in 3½ hours. It was then treated with 10,000 gallons of acid and shut in for the reaction. Continental Oil Company's Holkum 2, NE NW SE 27-2n-7e, encountered top of the Wapanucka lime at 2730 feet and was drilling below 3000 feet. Samedan Oil Company's Holkum 3, SE SW NE 27-2n-7e, topped Bromide formation at 3975 feet, had the first sand at 4070 feet, the second sand at an undetermined depth, McLish at 4185 feet and drilled to 4285 feet where is was acidized with 5000 gallons and yielded 4162 barrels on a potential test. The gas gauge was 2,581,000 cubic feet. Carter Oil Company's J. Smith 5, SE NE NE 31-2n-7e, a twin well, topped Simpson dense at 4250 feet, had Wilcox sand from 4310 to 4372 feet and was running tubing to wash in.

Jesse Pool

The Jesse pool, 5 miles southeast of Fitts, continued to baffle geologists as several of the tests now drilling were not checking with the completed wells. Sunray Oil Company's Shumard 1, NE SW SE 2-1n-7e, a wildcat test slightly over a mile northwest of the pool, topped Hunton lime at 3784 feet and was drilling below 3786 feet. In the pool Continental Oil Company's House 1, NW NW SE 12-1n-7e, had first Bromide sand at 4315 to 4355 feet, the second sand at 4417 to 4433 feet, McLish at 4440 feet and sandy dolomite at 4466 to 4480 feet. Total depth was 4647 feet and which point pressure-control equipment was being rigged up. The same operator's McCarty 2, NE SE NW 12-1n-7e, topped Hunton lime at 3518 feet and was fishing at 3832 feet; and Monroe 1, NW SW NW 12-1n-7e, had Woodford shale at 3523 feet, Hunton lime at 3705 feet, Sylvan shale at 3875 feet and Viola lime from 4010 to 4050 feet, the total depth. Nine-inch casing had been cemented at an unreported point.

Coal County

Shell Petroleum Corporation's Hill 3, SE SE NW 30-3n-10e, important wildcat test 6 miles northeast of the town of Centrahoma in northern Coal County, had soft sand showing oil from 6281 to 6282 feet, a 1-foot break of hard dry sand and 4 feet of soft sand showing oil and gas. Late in the week operators were coming out of the hole with a core cut between 6287 and 6291 feet.

Atoka County

Riverland Oil Company's Jones 1, SW SW NE 4-3s-9e, wildcat test in western Atoka County, had Hunton lime from 1517 to 1573 feet, topped Sylvan shale at the latter depth and was fishing tools at 1740 feet. Northwestward in northeastern Johnson County Magnolia Petroleum Company probably will abandon Green 1, NE NE NE 12-12s-7e. This test topped Bromide formation at 1925 feet, had a dry sand from 2475 to 2485 feet and 190 feet of sulphur water in 2½ hours from Wilcox sand at 2530 to 2535 feet, the total depth.

Moore Area

Denver Producing & Refining Company and Amerada Petroleum Corporation have staked location for H. F. Keller 1, NW NW NE 34-10n-2w, a wildcat test 1½ miles southeast of the discovery well in the Moore pool of northern Cleveland County. This will not be an attempt to extend the pool but a play for production on another structure following the Nemaha Granite Ridge trend upon which the Moore and Oklahoma City pools are thought to be located. Production to the southeast of the discovery well in the Moore pool was definitely limited by the drilling of Hall & Briscoe et al's Fant 1, SW SW NE 27-10n-2w, slightly over a mile southeast of the discovery well. This test went to 7511 feet, found the Wilcox sand several hundred feet low and was abandoned dry in December, 1935. Keller 1 is located on an 80-acre tract which British American oil Producing Company farmed out to E. P. Kilgore who in turn made a deal with Denver Producing & Refining Company and Amerada Petroleum Corporation. Anderson Prichard Oil Corporation is expecting to start work soon on School Land 1, SW SW SE 16-10n-2w.

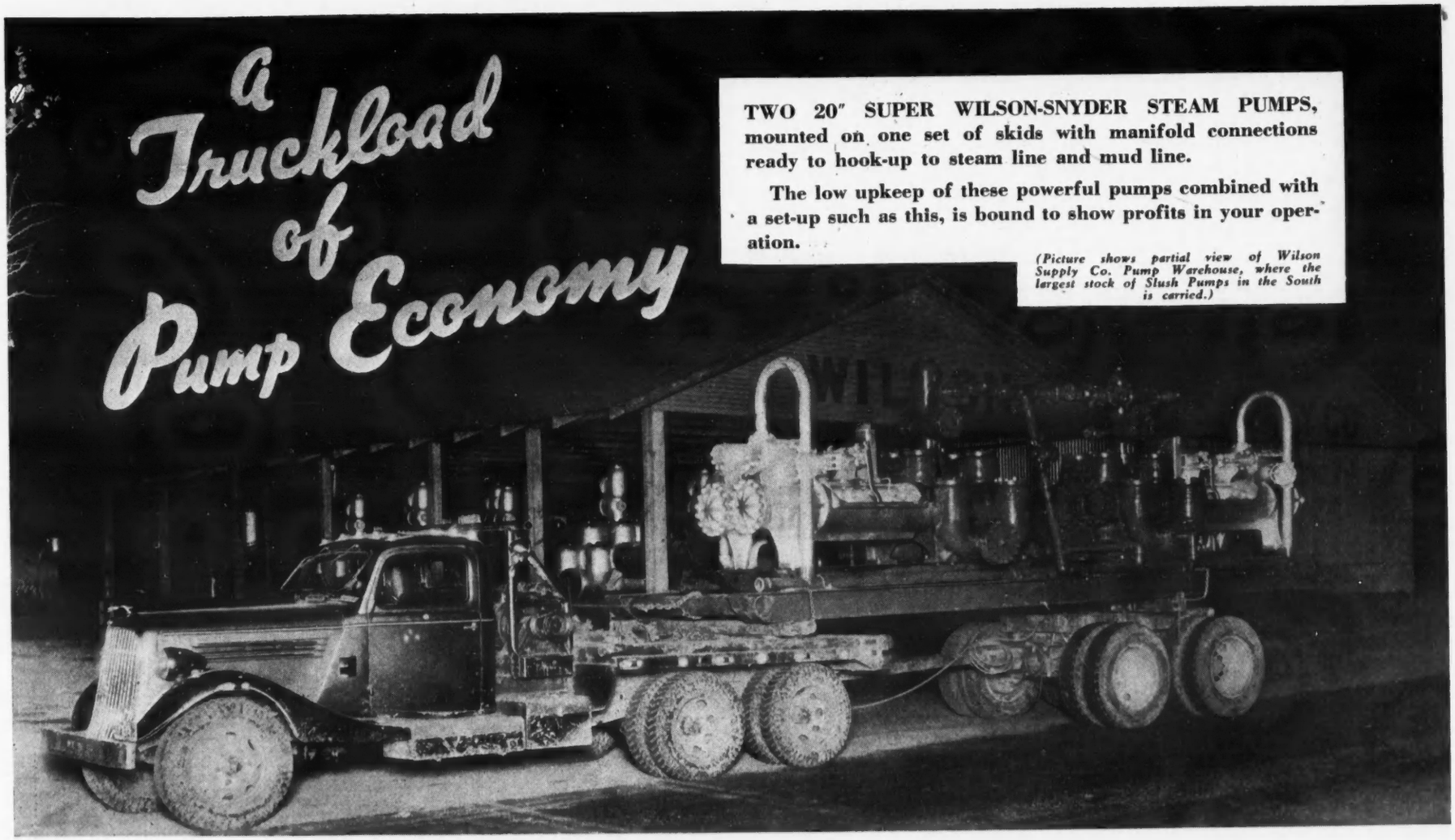
Judge Reford Bond, chairman of the Oklahoma Corporation Commission, announced that opposition to a 10-acre spacing rule for the Moore pool had been withdrawn when the case of Sinclair Prairie Oil Company et al was called for hearing on Friday, May 8. The order will reclassify the pool from

A Truckload of Pump Economy

TWO 20″ SUPER WILSON-SNYDER STEAM PUMPS, mounted on one set of skids with manifold connections ready to hook-up to steam line and mud line.

The low upkeep of these powerful pumps combined with a set-up such as this, is bound to show profits in your operation.

(Picture shows partial view of Wilson Supply Co. Pump Warehouse, where the largest stock of Slush Pumps in the South is carried.)



WILSON-SNYDER PUMPS *Distributed Exclusively on the Gulf Coast By*

WILSON SUPPLY COMPANY

1412 Maury Street
HOUSTON, TEXAS

OIL AND GAS WELL SUPPLIES

Mid-Continent Sales Office:
1702 National Bank of Tulsa Building, Tulsa, Oklahoma

Branches:
Barbers Hill, Kilgore, Greta, Gladewater, Bay City, Corpus Christi and Victoria, Texas; Lake Charles and Rodessa, Louisiana.

Class D or wildcat to Class C and will provide for the taking of potential gauges through tubing. It is understood that the spacing rule was straightened out when Sinclair Prairie Oil Company et al purchased M. T. Myers et al 1.10-acre tract upon which a location had been made in the SE NW NW 27-10n-2w. Myers and associates will be carried for an overriding royalty.

Western Oklahoma

Carter Oil Company's Davidson 1, C NW SW 2-9n-25w, in the West Oak area of western Beckham County, had failed to shut off water and was fishing for the bailer at 3696 feet, the total depth. This test has attracted considerable attention lately with a showing of oil and gas which gave indications of being on a commercial scale. This would be the first oil production in a locality which heretofore has produced only gas. In the next township west Wood Petroleum & Royalty Corporation's Blair 1, C NW SE 32-9n-26w, was shut down in granite wash at 2989 feet. It may be abandoned at that depth. McWhirter et al's Fee 1, NW SW SW 34-8n-19w, a wildcat test in southwestern Washita County, was fishing for tools with total depth at 1465 feet. A new wildcat operation was under way approximately on the line between northwestern Kiowa County and northeastern Greer County when John Hooser et al spudded No. 1, SW SW SW 24-7n-21w.

OKLAHOMA
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
CADDO COUNTY—		
Denver P&R Co.'s Sha-Cam 1, cse se 33-10n-10w	*	8147
Magnolia, Sames 4, sw ne ne 35-6n-10w	¶15¼	6573
CARTER COUNTY—		
Simpson-Fell's Byrd 1, sw sw sw 4-2s-2w	620	1381
Sinclair Prairie, Thomas 22, nw sw se 5-4s-3w	36	3149
COMANCHE COUNTY—		
Heiden, Mitchell 1, ne ne nw 10-3n-10w	*	1093
CREEK COUNTY—		
Adamson, Weaver 5, ne se se 5-18n-11e	5	1770
Simley & Brown, Jones 1, ne ne nw 7-15n-7e (pb 3075)	20	3672
Sinclair Prairie, Jones 21, cnl s½ nw 3-17n-7e (otd 2493)	15	2560
Jones 23, ne se nw 3-17n-7e (otd 2476)	30	2573
L. B. Jackson, Nolan "A" 3, ne ne ne 2-17n-8e (pb 1265)	4	1566
Bear 7, se se se 35-18n-8e	50	1621
Hanser et al, Burgess 1, ne ne se 25-18n-10e	20	1802
GRADY COUNTY—		
Magnolia, Miller 1, ne ne ne 28-3n-5w (otd 1012)	40	1895
HUGHES COUNTY—		
Brady Oil Co., Culver 1, ne se nw 28-7n-9e	lcn.	abd.
Carter, Hampton 4, sw se ne 1-9n-8e	528	1660
Manahan Oil Co., Oliphant "E" 2, ne se nw 1-9n-8e	864	1715
Oliphant "E" 3, sw se nw 1-9n-8e	1200	1716
Oliphant "E" 4, nw se nw 1-9n-8e	1256	1710
Sinclair Prairie, Oliphant 10, ne ne se 1-9n-8e	480	1698
Saco Oil Co., Oliphant 4, se ne sw 12-9n-8e	144	1771
Kingwood & Phillips, Rogers 7, ce½ sw sw 3-9n-9e	15	1096
Amerada and Stanolind, Kirby 1, nw nw nw 6-9n-9e	119	1685
JACKSON COUNTY—		
Gulf, Boucher 4, se sw sw 32-1n-19w	242	2655
KAY COUNTY—		
Kansas-Oklahoma O&G Co., Reinhart 1, cse nw 21-29n-1e	¶¼	815
NOBLE COUNTY—		
Tidewater, Conway 1-A, se sw ne 16-23n-2w (pb 3575)	*	4535
OKMULGEE COUNTY—		
Oklahoma Oil, Burgess 1, se sw ne 26-12n-12e (otd 2180)	15	2393
Hazlett et al, Burton 5, csl se se 25-14n-12e	*	3102
Howard, Rentie 2, ne nw se 18-14n-15e	*	1262
Harmon, Bright 1-A, se nw se 21-15n-12e	*	2281
Aggis Drlg Co., McKinney 3-A, sw nw sw 16-15n-14e	5	865
Gore, Anderson 1-A, se sw ne 36-16n-14e	*	1405
OSAGE COUNTY—		
Winona Oil Co., 20, nw nw ne 9-20n-12e (pb 502)	25	544
Comail Oil Co., 11, sw se sw 32-22n-8e	*	2325
Pure, 103, nw sw se 9-23n-8e (otd 2302)	20	2425
Bay Oil and Files, 2, se nw nw 19-23n-9e	*	2631
Lewis and Continental, 13, nw sw sw 16-24n-7e (pb 2644)	285	2649
Champlin Ref. Co., Maker 3, nw sw ne 15-25n-6e	200	2820
Sinclair Prairie, 13, se nw sw 30-25n-8e	14	2404
PAWNEE COUNTY—		
Adamson, Parker 2, se sw se 24-21n-7e (otd 2771)	8	2795
PONTOTOC COUNTY—		
Continental, James 1, ne ne sw 12-1n-7e	¶1½-3015	4743
Campbell, Malloy 1, ne nw nw 30-2n-4e	¶1/10	670
Fleetborn, Wooley 6, nw nw sw 27-2n-7e	¶2¾-4617	4276
Magnolia, Burris "A" 5, sw sw nw 27-2n-7e	¶2-3221	4300
Metropolitan Life 3, ne nw sw 27-2n-7e	¶2-3878	4289
Metropolitan Life 4, nw ne sw 27-2n-7e	¶2½-4453	4275
Samedan Oil Co., Holkum 2-A, nw sw ne 27-2n-7e	¶1	1219
Bishop Oil Co., Simpson 3, sw nw nw 28-2n-7e	¶1¾-3303	4310
Fleetborne et al, Woolley 4-A, sw ne se 28-2n-7e	4017	4285
Magnolia, Burris "B" 4, se se ne 28-2n-7e	¶3-3645	4295
Moore, Mack 4, ne sw se 28-2n-7e	¶2-2886	4045
Mack 7, nw se se 28-2n-7e	¶1-2112	4200
Skelly, Park College 8, ne sw ne 28-2n-7e	¶2½-5337	4300
Park College 9, se nw ne 28-2n-7e	¶2¾-4077	4306
Moore, McKay 5, se se se 29-2n-7e	¶1-2103	4340
Wirick 11, se sw se 29-2n-7e	¶1-3308	4435
Carter, Richards 7, sw ne se 30-2n-7e (otd 4188) (pb 4400)	2487	4503
Clark & Cowden, Brown 2, se se ne 12-4n-7e	12	1958
POTTAWATOMIE COUNTY—		
Conley, Vinson 2, sw ne ne 13-7n-4e (otd 4072)	820	4076
Helmerich & Payne, Bettis 1-A, cn½ se se 18-7n-4e (pb 3825)	40	4244
Hylton Phillips, Bettis 2, nw se sw 21-7n-4e	640	4150
M-K, Floyd 1-A, sw sw se 22-7n-4e	*	50
Magnolia, Brandenburg 6, nw nw nw 18-7n-5e (otd 3953)	2432	4078
SEMINOLE COUNTY—		
Lynch, Hall 2, sw ne sw 19-5n-6e	384	2548
Lake Oil Co., Harjo 1, ne nw sw 13-6n-5e	*	3965
Fleetborn, Patten 1, nw nw sw 18-6n-8e	317	2840
Ingleheart, Davis 1, ne sw ne 30-7n-8e	1835	3052
Sinclair Prairie et al, Harrison 1, ne ne nw 17-8n-8e	*	4290
Phillips, Lewis 3, ne sw se 27-9n-6e (pb 2289)	*	4027
Campbell, Toche 1, sw sw se 8-9n-7e	¶1-405	3454
Imperial Drlg Co., Aldridge 1, sw ne nw 32-9n-8e (pb 1900)	¶6	1987
Carter et al, Anderson 1, ce½ sw sw 2-10n-6e	600	4193
Combs 1, ne se nw 19-10n-6e	*	4600
STEPHENS COUNTY—		
Raizen Bros.' Crosbie 6, sw sw sw 23-1s-5w	4	388
TULSA COUNTY—		
Potter's Childers 1, sw sw ne 3-17n-14e	*	1580
Mechling's Grayson 2, csl ne ne 18-19n-14e	*	1349

*Failures; †Junked; ¶Million cu. ft. gas.

RUNNING HIGH
County test divides city pool interest

Oklahoma City.—A wildcat test which was running high in southeastern Oklahoma County tended to overshadow the intensive development now under way in the "Mansion Area" of the Oklahoma City pool where voters early in the week made three new extensions to the drilling zone. However, a possible quarter-mile westward extension of the productive area of the extension was being closely watched. Hollenback et al's McGinness 1, NW NW NE 15-11n-1e, 14 miles east of production in the Oklahoma City pool, topped Wilcox sand at 6234 feet, cored from 6235 to 6247 feet and recovered 9 feet of dry sand. The core hole was being reamed down to core ahead. This test is said to be running about 225 feet structurally higher than the old Mid-Continental Oil Company's Edwards 1, C SE SE 19-11n-1e, which found Wilcox sand dry at 6512 to 6530 feet, was plugged back from 6540 feet and produced a small amount of oil from Hunton lime before being abandoned in 1934.

In the "Mansion Area" Anderson Prichard Oil Company's Mitchell 1, SE SE SE SW 15-12n-3w, found base of Pennsylvania series at 6380 feet, cored a showing of oil and gas in Simpson dolomite at 6414 to 6420 feet and was thought to be in the Wilcox sand. Operators were withholding definite information on this test, a practice which has been followed on several of the recent north end tests. British American Oil Producing Company's Burnham 2, C S½ SW NW SW 23-12n-3w, in the discovery sector of the extension, flowed 715 barrels of oil in one hour along with gas at the rate of 20,000,000 cubic feet per day.

QUIET AT FRONT
Oklahoma City drilling advocates win battle

Oklahoma City.—Interest in the drilling extension war in Oklahoma City waned to the simmering point early in the week when on May 12 citizens voted by a margin of more than 3 to 1 to open the remainder of the east side of the city. The ballot carried proposals for 3 extensions, and the election brought a vote of only 6576 compared to more than 24,000 votes cast in a similar contest on March 24. The ballots covered all properties east of the Santa Fe tracks not already included in the drilling zone and threw the exclusive Lincoln Terrace residential district into the pot. Opposition to the extension, however, were quick to find new means of hindering the encroachment of derricks into this area of beautiful homes when attention was called to a city ordinance which would prevent heavy trucks from traversing most of the streets in the district.

Immediate advertising for bids on six blocks of state land at the University of Oklahoma Hospital and Medical School and the Crippled Children's Hospital will be made following a decision of the board of regents of the university to permit drilling. The bids

will call for one-fourth royalty and the highest cash bonus, three wells to be required on each of the three tracts. Drilling must be done with electrical equipment and no well may be located closer than 200 feet to the buildings. Governor E. W. Marland announced that he would lift a military order during the week. It was under this order that five wells were started on state lands under military guard several weeks ago. Militiamen were withdrawn two weeks ago when it became evident that the courts would hold in favor of the state.

PRESSURE STUDY

Oklahoma City.—A sub-committee of engineers and geologists named by the Oklahoma City operators committee and the Oklahoma Corporation Commission to study conditions in the "Mansion Area" of the Oklahoma City pool and to make recommendations in regard to conservation of gas and gas energy, has completed the investigation. Since much of the information included in the report is considered confidential by the operators who supplied the data, the report will not be made public at present. It was found that the average formation pressure is approximately 500 pounds per square inch and pressures as low as 430 pounds were measured.

During the development of the main part of the pool it was believed that wells would not flow naturally below about 1000 pounds formation pressure and that they could not be gas lifted below 500 pounds. The subsequent development of stage lift and other artificial methods revealed the fact that some wells could be lifted down to as low as 100 pounds pressure while others would not go below 400 pounds. The investigation indicates that very little gas is being wasted in the new area. Phillips Petroleum Company has completed its gas gathering system and is making connections to new wells as rapidly as possible. This company also is constructing a high pressure line into the north end and will be in position to supply gas for lifting purposes.

TEXAS-EMPIRE LINE
Work will increase capacity to Chicago

Tulsa.—The Texas-Empire Pipe Line Company, owned equally by The Texas Company and Cities Service Company, has approved plans which will involve the expenditure of $4,500,000 in the construction of a new oil pipe line into the Mid-Continent area and the looping of the company's system into East Chicago.

According to the announcement, 150 miles of 10-inch welded line will be laid due west from Sheldon, Missouri, to Eldorado and Valley Center in Kansas.

The present system involves a movement from Kansas southward to Cushing, Oklahoma, and then northeastward by the main line. The new line will therefore save 300 miles of movement in transporting from Kansas to East Chicago.

Nine 12-inch loops are to be laid between East Chicago and Sheldon, Missouri. Five of these will be between Sheldon and the Mississippi River and four in Illinois. The system between Sheldon and Chicago will thus be increased by approximately 18,000 barrels per day, raising the total capacity of 90,000 barrels per day.

Contracts for the construction will be let within the next few days.

KANSAS WORK OFF

Wichita, Kansas.—Generous rainfall during the past two weeks has removed the threat of water shortage in Western Kansas areas and field work was continuing at the unusually rapid rate established during 1935 and the first quarter of 1936.

New work during the past week declined about 20 percent when scouts made 36 first reports from 13 counties. Rice and Russell Counties were tied for the lead with seven first reports each; Reno County had five; Barton County, four; Ellis County, three; Cowley and Woodson Counties, two each; and Harvey, McPherson, Rooks, Saline, Sedgwick and Sumner Counties, one each.

The 27 completions included 17 oil wells with a total initial yield of 18,602 barrels, three gas wells with a combined initial volume of 42,500,000 cubic feet, five dry holes and two abandoned locations. Completed drilling amounted to 99,533 feet which included 24,551 feet in eight wildcat tests and 102 feet in three old wells.

J. A. Brouck et al have started work at Thelander 1 approximately 11 miles south of Salina in southern Saline County. Major interest in the test will be due to its location one-half mile southeast of the old Olson pool, which was discovered in December, 1929, and abandoned about a year later after producing only a small amount of oil from Arbuckle (siliceous) lime.

South of the town of Centerview in southern Edwards County, H. V. Elwell, Stanolind Oil & Gas Company and Skelly Oil Company had cemented casing at 4037 feet after topping Lansing lime at 4028 feet in Donovan 1, C SE SE 14-26s-18w, wildcat more than 10 miles from the nearest production. Total depth is 4055 feet.

Carlock and Rosespring Drilling Company have staked location for No. 1, SW SW SW 1-19s-11w, four miles north of production in the Silica pool of Rice and Barton Counties. A second wildcat test was under way in the same locality as Lee-Grant Drilling Company started work at No. 1, NE NE NE 13-19s-11w, three miles north of the pool.

Atlantic Oil Producing Company's Mark 1-B, C NW SW 14-20s-33w, westernmost drilling well in the state, was below 4610 feet looking for upper Mississippi lime from which the two wells in the Shallow Water pool produce. About 10 days ago this test encountered a stained sand in the Basal Pennsylvanian but tests provided it not of commercial importance.

Marathon Oil Company's Zeller 1, C SW NW 17-35s-8w, Harper County, deepest test now under way in Kansas, was still fishing for drill pipe with total depth at 5418 feet.

KANSAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
BARBER COUNTY—		
Barbara Oil Co., Angel 2, cne ne 22-33s-13w (otd 4923)	*	4939
BARTON COUNTY—		
Price et al, Ehrlich 1, nw nw se 10-16s-13w (otd 3361)	*	3442
Arch Merriam, Soekem 1, sw sw se 21-17s-11w	*	3300
Mid-Continent, Matzek 5, nw sw se 25-19s-11w	2199	3297
Continental, Risse 8, cw½ ne se 36-19s-11w	1983	3280
Gulf, Wendell 4, se ne ne 36-19s-11w (pb 3293)	115	3299
Phillips, Matzek 4, ce½ sw ne 36-19s-11w	1552	3300
BUTLER COUNTY—		
Pryor & Lockhart, Gunther 3, nw sw ne 29-26s-7e	170	2758
Jones et al, Sandberg 1, nw nw se 11-28s-6e	*	825
Purdew et al, Sandberg 1, sw nw ne 11-28s-6e	*	3210
COWLEY COUNTY—		
Mickleson et al, Wallace 1, sw se se 10-33s-4e	*	35
ELLIS COUNTY—		
Uscan, Bemis 1, ne ne ne 21-11s-17w	1686	3351
Twin Drlg Co., Reidel 1, sw sw ne 27-13s-16w	*	3536
GRANT COUNTY—		
Piney O&G Co., Hastings 1, csw 2-29s-36w	¶9	2870
GREENWOOD COUNTY—		
Western Kans and Phillips, Pees 1, cn½ n½ se 30-22s-11e	*	2163
McPHERSON COUNTY—		
Continental et al, Huntsman 1, se se nw 29-21s-1w	1476	3276
RENO COUNTY—		
Olson & Shell, Goering 7-A, csw 26-23s-4w	1643	3590
Helmerich & Payne et al, Schwaiger 1, sw se ne 27-26s-5w	*	4147
RICE COUNTY—		
Empire, Jansen 2, se ne nw 3-18s-8w	1050	3262
Derby Oil Co. 1, Callis 1, se se sw 32-19s-9w (pb 3274)	140	3276
Witts, Hall 1, se se nw 3-20s-9w	*	3252
Gulf, Schubert 1, se sw se 9-20s-10w	*	3453
Skelly, Graham 5, se se se 16-20s-10w	2534	3349
RUSH COUNTY—		
Marathon, Brack 1, csw 24-18s-16w	¶28	3515
RUSSELL COUNTY—		
Bridgeport and Lauck, Wycoff 1, se nw ne 27-11s-13w	*	3460
Wolf Creek, Dillner 1, sw sw sw 36-13s-15w	*	3329
Empire, Crawford 3, nw sw sw 2-14s-15w	755	3286
Bridgeport, Witt 4, ne ne sw 3-14s-15w	2388	2870
Derby Oil Co., Karst 1, sw nw ne 27-15s-14w (pb 3263)	10	3379
Central Pet, Boxberger "B" 1, ne ne ne 35-15s-15w	543	3151
SEDGWICK COUNTY—		
Faulkner, Underwood 1, sw sw sw 23-25s-1w (pb 2713)	15	3253
Western Pipe & Supply So., Rapp 1, nw nw nw 22-26s-2e (otd 2955)	*	2960
STEVENS COUNTY—		
Stevens County O&G Co., Young 2, cne 14-34s-39w	¶5½	2738
SUMNER COUNTY—		
Sinclair Prairie, Kansas 7, ne se sw 28-31s-1w	343	3681
Jones, Green 1, nw nw nw 11-32s-2e	lcn.	abd.
Houghton et al, Christian Church 1, ne ne ne 14-32s-2e	lcn.	abd.
Helmerich & Payne et al, Elwell 1, nw nw ne 18-34s-1e	*	3940

*Failures; †Junked; ¶Million cu. ft. gas.

RIG SHORTAGE

Midland, Texas.—Every rotary rig available for contract work in West Texas and Southeastern New Mexico is now in service. Many contractors report that they have been booked up several locations ahead on each rig. Demand for rigs exceeded the supply recently when a large volume of new development was launched in Winkler County and to the north in the sandy-

lime belt of Lea County, New Mexico. Contractors average $4 per foot in Winkler County, and $4.50 per foot for the New Mexico portion of the same production trend. Higher prices prevail in the older fields in the latter state that produce from dolomite lime, with a treacherous high-pressure gas zone in the upper section of the lime.

Competition offered by Oklahoma City and active areas in the Texas-Louisiana Coastal areas by reason of better living conditions has forced the West Texas and New Mexico contractors to boost the wage scale for drillers to $11 per day, and derrick men and firemen to $7. The raise averages about $1 per day for each classification, although a few of the contractors were paying this scale in order to retain picked men. The recent drilling boom launched in Oklahoma City's extension area pulled a large number of veterans from the Permian Basin region because of better living conditions.

GOLDSMITH EXTENDED

San Angelo, Texas.—Production limits of the Goldsmith field, Ector County, were extended about three miles to the west through Wm. H. Dunnings et al's Cummins 1, having filled 500 feet with oil from Saturated lime at 4254-4257 feet. It is also making 1,000,000 feet of gas. Main section of lime pay has not been penetrated. Operators will probably run casing before deepening.

Two new producers in prospect for the 4300-foot lime pay in the Sand Hills fields, western Crane County.

Humble Oil & Refining Company's Tubb 2, an inside location showed 700 feet of fluid mostly oil, on drill stem test at 4219-4375 feet. Hole is to be reamed to 4265 feet to make a second formation test. The company plans to carry this test to the Simpson lime and sand series of the Ordovician unless an attractive producer is developed from the Permian lime zone.

Sinclair Prairie Oil Company et al's Tubb 1, north outpost, recovered favorable oil saturation in nine-foot core pulled at 4312 feet. Gulf Oil Corporation's Waddell et al 2, a prospective Ordovician lime test. Is drilling below 2300 feet, while the same company's Tubb 2 has progressed beyond the 1700-foot level.

WEST CENTRAL TEXAS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
CALLAHAN COUNTY—		
R. Hart & John Korp, N. M. George 1	*	1047
E. G. Johnson et al, S. G. Hobbs 1	*	1512
BROWN COUNTY—		
L. Ehlinger et al, Mrs. A. Armstrong 2	30	1298
EASTLAND COUNTY—		
TP Coal & Oil Co., T. J. Earnest 12	26	1901
PALO PINTO COUNTY—		
N. B. Crenshaw et al, J. H. Robinson 1	*	1585
W. K. Gordon et al, Johnson 1	*	3634
E. Lloyd et al, P. F. Dalton 2	5	1404
SHACKELFORD COUNTY—		
Gilman & McMurry, Jeter 15	20	936
Humble, J. H. Nail 3, sec 150	*	1634
Reliance O&R Co., G. R. Davis 1, sec 3	*	1815

*Failures; †Junked; ¶Million cu. ft. gas.

North Extension

HENDRICK POOL OUTPOST EARNS HIGH POTENTIAL

WEEKLY STAFF REPORT

Midland, Texas.—Production north of Hendrick field, Winkler County, was substantially advanced when Atlantic Oil Producing Company and Wahlenmaier Petroleum Corporation's J. B. Walton-Humble 1-A, SEc S½ SW½ Section 34, Block 74, PSL Survey, indicated a potential flow of 100 barrels oil per hour on brief gauge from dolomite lime at 3070 feet. It is more than three miles north of nearest production in the Hendrick field.

The intermediate territory offers excellent prospects for flush production, possibly confined to a width of from one-half to three-quarters of a mile, as subsurface data indicates that this portion of the reef type of structure is extremely narrow.

R. H. Henderson, Uscan Oil Company and associates recently completed two large producers on offset locations between the new strike and the main field.

The north extension well of Hendrick field has been idle for some weeks in a gas zone at 2883 feet, and Atlantic Oil Producing Company has assumed operating control. The well was deepened to 3070 feet, or 196 feet sub-sea, having topped the Winkler lime at 2640 feet, or 234 feet above sea level. An accurate production gauge was delayed for lack of storage.

Henderson et al's Walton-Humble 2-B, NWc Section 10, Block 26, the most recent completion along the north trend, logged first lime at 2605 feet, or 269 feet above sea level, and was drilled to 3051 feet, or 177 feet sub-sea. It is about 50 feet higher on top of lime than the west offset.

Atlantic-Wahlenmaier interests are rigging up for two more tests, consisting of Leck 1-B, NWc NW¼ Section 3, Block 26, and Leck 2-C, SWc S½ SW¼ Section 3. An old completion in the NWc of the latter 80-acre lease missed the prolific pay zone after drilling through the saturated dolomite and into sulphur water, but it served as a guide for Henderson et al in projecting the trend of production from the Hendrick field.

South Sayre Wells

The Sayre field south extension area, which produces from sandy-lime zone immediately to the east and parallel to the Hendrick field, recorded high potentials for several of the outpost completions.

Mid-Continent Petroleum Corporation's J. B. Walton 1, SEc NW¼ Section 24, gauged 1413 barrels high gravity oil daily after a 170-quart nitro shot at 2800-2980 feet, having previously made 27 barrels per hour natural. Top of the lime was logged at 2390 feet, or 479 feet above sea level. The structural position of this well is about normal with nearest wells in the field proper and those to the south.

W. L. and E. J. McCurdy's McCutcheon-Pure 1, SWc Section 16, one-half mile east of nearest production on the south end, flowed 1135 barrels initially after a 330-quart nitro shot at 2780-2968 feet. Top of the lime was called at 439 feet above sea level.

Bert Fields et al's Clapp-Pure 1, an inside location, gauged 250 barrels oil during first 10 hours after 350-quart shot at 2800-3035 feet, and Tide Water Oil Company's Walton 1, SEc SW¼ Section 24, flowed 1385 barrels after shot of 300 quarts in sandy-lime pay at 2817-2953 feet.

These completions make the Sayre south extension area attractive for continued deevlopments, and an ambitious program is getting under way, although it is somewhat hindered by scarcity of rotary rigs.

Proration restrictions materially add to the flowing life of this area, as evidenced by the fact the original Sayre area, discovered in October, 1934, continues to yield high potentials on new completions. All operators adhere to a spacing of one well to 10 acres.

Production on the north end of Sayre field was extended one location north when Humble Oil & Refining Company and Tide Water Oil Company's Walton 2-D responded to a nitro shot in pay at 2790-2993 feet with a flow of 434 barrels oil through two-inch tubing. Top of the lime was logged at 2595 feet, with an elevation of 2914 feet.

Superior Oil Company's M. J. Hill 1, SEc E½ SW¼ Section 18, Block 11, PSL Survey, a west offset to Richardson Oils, Incorporated's, small semi-wildcat oil producer in southern Winkler County, showed only a small volume of gas and oil with sulphur water in drilling to 3155 feet. Top of the lime was logged at 2228 feet, with an elevation of 2761 feet, or about 15 feet higher structurally than the producer, which was plugged back from 3846 feet to 3155 feet for completion.

Another prolific oil producer was added to Waddell field, northern Crane County, when Magnolia Petroleum Company's W. P. Edwards 5, SEc SW SW Section 2, Block B-23, PSL Survey, gauged 228 barrels of oil during the first hour from porous limestone at 3518-3521 feet. Later reports indicated that a substantial boost in the oil and gas flow was attained by treating the formation with 5000 gallons of acid solution. The rig has been skidded to drill Edwards 6 one location to the east.

Water Table Established

The water table for the main section of the Goldsmith structure, Ector County, was established by Gulf Production Com-

pany's C. A. Goldsmith-Scharbauer 6, NEc NW¼ Section 4, Block 44, T&P Ry. Survey, T-1-S, in drilling to the sulphur water horizon at 4243-4260 feet. It was rated at 275 barrels daily on natural flow from saturated lime topped at 4176 feet, or 1023 feet below sea level. The hole has since been plugged back to 4225 feet, or 1072 feet below sea level. Four previous completions on the 19,840-acre leasehold are bottomed at sub-sea depths ranging from 1007 feet to 1070 feet. This new well is a south offset to Wm. H. Dunnings, Jr., et al's small oil producer, which was halted at 1016 feet sub sea. The latter will be deepened later, as it did not reach the main oil zone in the lime section.

Dunning et al's H. E. Cummins 1, NEc SE¼ Section 33, Block 45, T&P Ry. Survey, T-1-N, wildcat project situated about 4¼ miles northwest and on a geological strike from the above Ector County wells, was drilling below 4228 feet, with oil saturated lime logged at 4163-67 feet and 4175-98 feet. Top of Yates sand was called at 2760 feet, and first lime marker at 3820 feet, with an elevation of 3220 feet. It is expected to yield commercial production.

In the extreme northwest corner of Ector County, Grisham-Hunter Corporation, Abilene, is moving in rig to start operations on the second of a trio of wildcats to be drilled on a geological feature that centers near the common corners of Ector, Andrews and Winkler Counties. This new project, known as R. B. Cowden 2, is located at C SE¼ Section 8, Block 45, T&P Ry. Survey, T-2-N, or 1⅜ miles west of R. B. Cowden 1, a previously announced location. The company is also starting up Ratliff-Bedford 1, C NW¼ Section 24, Block 73, PSL Survey, Andrews County, situated about six miles northwest of the latter location.

Progress made by Stanolind Oil & Gas Company's E. F. Cowden 1-B, NEc Section 14, Block 43, T&P Ry. Survey, T-2-S, situated 6000 feet northwest of nearest production in the Foster area, Ector County, is being followed closely by lease owners in the area in expectation of a large production yield. This outpost was drilling at 4230 feet, according to late reports, or about 40 feet above the water table. Top of the lime was logged near the 3905-foot level, with an elevation of 2970 feet, or about eight feet higher structurally than the discovery well. A single flush producer in the area is likely to touch off an active drilling program on nearby leases.

Plugging orders were issued last week for Fleetborn Oil Corporation and Mid-Continent Petroleum Corporation's F. C. Dodson 1, south central Glasscock County wildcat, after encountering additional sulphur water in drilling to 3240 feet.

STEPHENS COUNTY

Ranger, Texas.—A brief production gauge given Lone Star Gas Company's R. W. Brooks 4, southwestern Stephens County, indicated the well is capable of from 1000 to 1500 barrels oil and 21 million feet of gas daily from lime at 3417 feet. It is located 1205 feet from south and 1043 feet from east line of Section 54, Block 7, T&P Ry. Survey. Surface elevation is 1457 feet. This unusually large producer for the county is on the north end of an area that contributed prolific production on several locations drilled some years ago.

TEXAS PANHANDLE
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
GRAY COUNTY—		
Adams, Prince & Tharp, Morse-Cantone 5	7	2665
Cambrian Oil Co., C. S. Barrett 5	565	3283
Empire O&R Co., L. H. Cunningham 6	467	3301
Magnolia, E. Haggard 3	503	3290
Skelly Oil Co., L. Holmes 1	*	3165
Southern Pet. Explo. Co., Vaughan 4	514	3235
Texoma Nat'l Gas Co., F. A. Vaniman 1-E	¶23.7	2670
HUTCHINSON COUNTY—		
Howard Bean et al, W. S. Christian 1	*	3285
Conoco, E. B. Johnson 3-C	505	3060
Phillips Pet. Co., J. A. Whittenburg 1	370	2888
MOORE COUNTY—		
Magnolia, E. C. Britian 2	¶35	3051
WHEELER COUNTY—		
Cub Oil Co., D. N. Massey 2	¶39	2152
Fain-McGaha Oil Corp., Binkley-Caine 6	223	2519
Hanlon-Euchanan, Inc. & Henagan, Woodward 1	¶22	2240
Palmer et al, J. J. Sparlin 1	*	2100

*Failures; †Junked; ¶Million cu. ft. gas.

NORTH TEXAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
ARCHER COUNTY—		
L. T. Burns et al, A. J. White 1, blk 111	*	1210
Clint Crosby et al, M. B. Ray 1, blk 150	*	1135
Golding & Cochran, Richardson 5, blk 1	*	1300
Stinnett 3, blk 19	*	740
Hamilton Pet. Co., Abercrombie 7	12	1183
Abercrombie 38	63	1160
Ward 3, sec 1381	*	1054
J. D. Hardegree et al, G. Symank 1, blk 11	*	1460
H. M. Kelleher et al, Watson 1, blk 6	*	775
Kimbell & Bohner, J. D. Carpenter 8, sec 39	5	1064
C. B. Long et al, Turbeville 9, blk 156	15	1506
Magee & Stipe, Garrett 6	*	726
Morrison & Jackson, J. J. Perkins 2, blk 21	*	730
The Texas Co., J. R. Garvey 2, sec 1856	*	830
BAYLOR COUNTY—		
Pet. Producers Co., Portwood 30, sec 1281	25	1416
COOKE COUNTY—		
Bridwell Oil Co., Trew 2-B	*	1807
F. W. Merrick, Inc., Knabe 29, blk 12	20	840
L. E. Rader et al, McCubbin 1	*	1722
Ruwaldt & Couch, Trew 2	20	705
Trew 3	20	754
The Texas Co., Walterscheid 10	10	816
JACK COUNTY—		
C. L. Gannaway et al, S. J. Christian 1	*	730
Lewis Prod. Co., Bryson-Bridwell 1	340	3015
Perren & Gillespie, Nora Kee 1	350	3014
MONTAGUE COUNTY—		
O. V. Beck et al, Davenport 18	35	1515
Lesh & McCall, R. W. Cunningham 3-A	35	972
The Texas Co., Cunningham 10-A	43	917
THROCKMORTON COUNTY—		
Bearman Oil Co., K. Ledbetter 8	*	780
WICHITA COUNTY—		
Butex Oil Co., W. C. Parker 1, blk 23	*	1856
Geo. W. Cooper et al, Waggoner Bros 38, blk 13	*	1326
F. M. Gates et al, R. W. Hall 1, sec 21	*	800
Jennings Drl. Co., G. Jennings 3-A, sec 8	5	968
Maro Oil Co., Inc., Whittenbach 1, blk 303	20	1937
W. B. Omohundro et al, S. P. Gibson 4, blk 302	21	1927
Rathke Oil Co., Burnett 11, sec 4	*	385
Burnett 12, sec 4	10	692
Burnett 13, sec 4	*	703
R. M. Peeler 19	*	873
Turman Oil Co., Waggoner Est. 25, blk 148	*	2211
Waggoner Ref. Co., Waggoner 6-AA, blk 148	100	1604
S. H. Walton et al, J. L. Powers 1, sec 21	5	822
J. L. Powers 2, sec 21	*	181
WILBARGER COUNTY—		
Bason Drl. Co., Waggoner Est. 2-A, sec 52	*	2590
Fain-McGaha Oil Corp., Waggoner Est. 8-Y, sec 43	125	2421
Lawson & Leavell, Waggoner Est. 5-A, sec 109	125	1446
YOUNG COUNTY—		
Alexander & Beavers, E. A. Hausler 1, sec 2	*	1093
L. T. Burns et al, Andrews 5, sec 1399	15	934
C. E. Braune 1, sec 188	*	1265
Roy I. Carter et al, G. B. Hamilton 1, sec 1480	*	1000
Chambers & Humphreys, Benson 2, sec 1392	100	906
C. C. Counts et al, W. E. Edwards 1, sec 71	32	1219
Duncan et al, Benson 9, sec 1391	185	904
N. D. Goldsmith et al, O. B. Stowe 2, sec 2	*	1135
Griffin et al, Morrison 1, sec 159	*	1090
C. E. Jeffery et al, J. D. Carpenter 3, sec 237	5	1039
Jerome McLester-Dobbs Oil Co., N. Loquay 1	238	4126
J. J. Moran et al, W. B. Howard 9, sec 3401	186	918
Solo Oil Co., E. A. Hausler 2-A, sec 2	5	1075
O. B. Stowe 7, sec 2	*	1086
Underwood Drl. Co., Campbell-Conoco 1-E, sec 1390	50	884
Campbell-Conoco 2-E, sec 1390	85	875
Campbell-Conoco 3-E, sec 1390	105	875
Campbell-Conoco 5-E, sec 1390	105	883

*Failures; †Junked; ¶Million cu. ft. gas.

WEST TEXAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
CONCHO COUNTY—		
Maverick Oil Co., Jim Rice 1	*	2454
FISHER COUNTY—		
Gen'l Crude Oil Co., T. Willingham 5	*	3162
GLASSCOCK COUNTY—		
Fleetborn Oil Corp.-Mid-Continent Pet. Corp., F. C. Dodson 1	*	3240
HOWARD COUNTY—		
Ennisbrook Oil Corp., Rhoton 9	†	730
JONES COUNTY—		
Bridwell Oil Co.-L. Fikes, Jennings 2-B	115	1948
Danciger Oil Ref. Inc., L. H. Pearson 1	*	2303
Fain-McGaha Oil Corp., N. Haydon 1	*	2335
Thos. D. Humphrey, E. C. Duke 1	*	2455
W. H. Peckham & Danciger, Stamford Water Works 1-B	180	2067
Ungren & Frazier, H Woods 1	*	2404
MARTIN COUNTY—		
Woodley Pet. Co.-Kirby Pet. Co., F. A. King 1	*	3650
UPTON COUNTY, (McCamey Field)—		
L. H. Choate & Geo. McCamey, Cordova Union 1	45	2170
WARD COUNTY—		
Abell Bros.-Tex-Mex Pet. Corp., Pecos River 1	*	2425
Bond Oil Corp.-Bohago Oil Corp., J. W. Maxwell 1-A	4861	2530
J. W. Maxwell 2-A	3461	2530
Mid-Continent Pet., Corp., R. O. Potts 1	253	2393
Rio Bravo Oil Co., D. Olcott 3	1681	2530
Turman Oil Co., Sloan-Shell 6-B	617	3050
WINKLER COUNTY, (Brown-Altman Field)—		
Humble, J. B. Walton 6-A	339	3180
TP Coal & Oil Co., Brown-Altman 1	212	3160
WINKLER COUNTY—, (Halley Field)—		
Skelly Oil Co., Halley 9	509	2880
WINKLER COUNTY (Halley Field)—		
Bert Fields et al, O. Clapp-Pure 1	600	3035
Humble, J. F. Howe 5	1497	3020
W. L. & E. J. McCurdy et al, McCutcheon-Pure 1	1135	2968
Mid-Continent Pet. Corp., J. B. Walton 1	1413	2980
TP Coal & Oil Co., Daugherty 9	723	2930
Tide Water, J. B. Walton 1	1385	2953
R. A. Westbrook Oil Corp., Daugherty 7	1053	2983
WINKLER COUNTY, (Kermit Field)—		
Sid Richardson Oils, Inc., Walton-Pure 3	672	3550

*Failures; †Junked; ¶Million cu. ft. gas.

Talco Is Extended

COMPLETION GIVES FIELD LENGTH OF FOUR MILES

WEEKLY STAFF REPORT

Tyler, Texas.—Production in Talco field, Northeast Texas' first strike in the Paluxy, or upper section of the Trinity sand series, was extended more than 1½ miles to the southeast by two flowing completions on leases developed by Humble Oil & Refining Company. Two additional tests were preparing to complete at the close of the week after entering the Paluxy zone with favorable structural positions. The field has three flowing wells and one pumper scattered along a four-mile front immediately south and parallel to the Mexia fault zone.

The two new producers registered a greater initial flow than previous completions through having penetrated more of the sand section, but the increased flow did not fulfill expectations.

Humble Oil & Refining Company's Mary B. Groves 2, located 990 feet from the south line of an 82.9-acre lease, Ben Jones Survey, and about 8800 feet southeast of the discovery producer, gauged 39 barrels of fluid, including 12 percent wash water, per hour flowing through open 2½-inch tubing. A more representative gauge that followed amounted to 455 barrels of fluid, with less than three percent wash water, in 9½ hours. This outpost is bottomed at 4355 feet, or 4003 feet sub-sea, and penetrated 172 feet of the Paluxy section without encountering water. The closed-in pressure registered 220 pounds. A previous test on the north end of this lease was temporarily abandoned at 4492 feet, or 4183 feet sub-sea, having failed to cut through the fault plane to the upthrow side of the fault.

Humble Oil & Refining Company's Myra Galt 1, NWc of 80-acre lease, R. I. Winn Survey, situated 4300 feet southeast of the original producer for the field, was completed earlier in the week, flowing 344 barrels oil on 14-hour gauge through open tubing, with 25 pounds back pressure. Later gauge indicated the well flowing 32½ barrels hourly, with about two percent wash water. It was drilled and cored 163 feet into the Paluxy section to 4349 feet, or 4003 feet below sea level.

Interest in the area now centers upon the outcome of the next two completions that are utilizing extra efforts to protect the oil formation from drilling fluid. Lucey Petroleum Company et al's A. W. Crawford 1, SEc of 25-acre lease, O. James Survey, Franklin County, and about 1900 feet west by north of a flowing producer, logged top of the Paluxy zone at 4121 feet. Core barrel was used between 4100 and 4182 feet, and an 11-inch diameter hole then cut to 4297 feet, or 3926 feet below sea level. Seven-inch pipe has been cemented on top of the Paluxy, using the so-called squeeze job method. The large diameter hole is expected to afford better drainage of oil and gas, while the squeeze job method of casing the well materially lessened the number of hours that the column of rotary drilling fluid remained in contact with the producing zone. Crawford 1 cut through the fault plane in the Woodbine series. Owners report that this test is higher structurally than any of the previous completions.

Field Lacks Drive

Permits have been granted by the railroad commission to Lucey Petroleum Company et al to drill 12 tests on the Crawford 25-acre lease. Each well is spaced 150 feet from the property line of the long and narrow tract. Owners report that in view of the absence of any appreciable volume of gas and water drive to move the oil to the sources of outlet that close spacing of wells will be necessary to properly drain their property, this accounting for the unusual number of wells projected. Lucey Petroleum Company and Ralph E. Fair, Incorporated, each own one-eighth interest, Byrd & Frost, Incorporated, have one-half interest, and the remaining one-fourth is held by C. & G. Oil Company.

Standard rig front has been installed on a rotary rig used by Magnolia Petroleum Company in drilling C. M. Carr 1, west offset to the discovery well in Titus County, to drill in with cable tools. Seven-inch pipe was cemented at 4151 feet after drilling to the top of the Paluxy. This will be the first completion with cable tools. Carr 1 logged only 27 feet of the Georgetown lime, and cut through the fault plane at 3979 feet, where the first Fredericksburg shale was encountered.

Tide Water Oil Company is the third major to enter the field, having started operations on C. M. Carr 1, NWc of its lease adjoining the discovery lease on the east. Jule Alford et al have erected a derrick to drill J. P. Fry 2, northeast corner of 47.48-acre lease, I. P. Stern Survey, and due south of the discovery well. Their first test, located 9000 feet south of production, missed the pay sand and was abandoned in April at 4220 feet. Nemo Oil Company has erected derrick to drill Talco Independent School 1, SEc of a five-acre lease, I. P. Stern Survey.

Pure Oil Company's .Faulkner 1, deep test for the Mount Enterprise structure in eastern Rusk County, failed to encounter Paluxy sand series in the top of the Trinity, and was logging Upper Glen Rose lime formation at 5245 feet. Absence of the Paluxy was not disappointing for this area as the Paluxy is generally found on the north portion of the Woodbine sand belt of East Texas.

Reports indicate that C. F. Lytle et al's Thomson 1-T, Trinity test on the west edge of the Mexia field, will be plugged back and casing perforated to try for production in the Lower Glen Rose and then possibly the Upper Oolitic limestone series after failing to produce from the Basal Trinity sand series. The hole is bottomed at approximately 6205 feet, with seven-inch pipe cemented near the 6150-foot level. Fresh crude was used for circulation in drilling out cement plugs, thus accounting for presence of an occasional small head of oil under agitation.

Wm. A. Reiter et al's bounds 2 tested salt water in Woodbine section at 3390-3465 feet, and will be abandoned.

In western Cherokee County Humble Oil & Refining Company's Goodson, near Ironton, made two unsuccessful drill stem tests in Woodbine at 4820-4838 feet. The last core pulled from this wildcat carried a thin layer of sand with a petroleum odor and the remainder was said to have a salty taste.

OPERATIONS GAIN

Tyler, Texas.—About one-third of the producing wells completed in the East Texas field the past week failed to yield a natural flow and will require lifting equipment. These non-flowing wells are situated near the edge of the structure, or on properties having reservoir pressure below the level required to afford natural flow.

Completions averaged 9 daily for the period, and included 59 producers, 3 failures, and a small gas well on the extreme southeast edge of the field. Twenty of these new producers were completed by pumping, swabbing or gas lift.

Volume of permits granted and applications pending before the Texas Railroad Commission as exceptions to the spacing rules forecasts a substantial gain in field work for some weeks hence. This is borne out by a late survey that reveals 110 active rigs as compared to a total of about 100 the previous week. A large percentage of this proposed development is on properties already developed on a basis of more than one well to five acres. Operators that hold to the theory that economic danger lies in the path of this continuous drilling program, based on years of practical experience in Woodbine sand areas, are becoming disturbed over the future prospects for new wells required by royalty interests as protection against inequal offset drainage.

EAST TEXAS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
JOINER AREA—		
L. W. Callender et al, Cora Watson-Shell 1 (100-ac)	¶2	3670
W. H. Gant-Garvin & Wegener, Hale 11 (158.64-ac)	500	3658
E. H. Gibbs & J. V. Howell, L. Trimble 1 (4.9-ac)	*	3757
Humble, J. A. Plowman 44-A (228½-ac)	8000	3737
J. W. Turner 2-B (113.7-ac)	240	3578
R. L. Mathis & Ortiz Oil Co., E. E. Wallace 1 (89½-ac)	60	3648
Marathon, E. E. Moores 32 (202-ac)	2400	3646

Company, Well and Location	Init. Prod. Bbls.	Depth
Ortiz Oil Co., L. Tolliver 8-A (16.18-ac)	2000	3747
Overton Ref. Co. (was Bateman), Worrel 2 (48.34-ac)	200	3597
Worrell 6 (48.34-ac)	360	3572
Tom Potter et al (was W. L. Allen-Fullwood), Gilstrap 1 (97/100-ac)	40	3567
Sinclair Prairie, Mayfield 15-B (149.67-ac)	7000	3619
Mayfield 64-A (373.74-ac)	6000	3767
W. W. Holland 14 (50-ac)	800	3680
A. L. Slaughter & Kugle, Frederick 4 (11.34-ac)	240	3625
Tide Water, L. B. Rollins 3 (22-ac)	8000	3658
KILGORE AREA—		
Bowles Oil Co., D. Wells 17 (100-ac)	2000	3693
Gralenor Oil Co., King 12 (78.33-ac)	1000	3698
Carl G. Dunham et al, Scoggins-Republic 9 (57.8-ac)	3600	3653
H. H. Groneman et al, Mayfield 6 (35-ac)	120	3630
Gulf, J. C. Clayborn 4 (20-ac)	5500	3657
Hamilton & Ellis, Utzman 2 (67-ac)	700	3485
Humble, J. D. Crim 170 (914.51-ac)	7000	3698
L. D. Crim 172 (914.51-ac)	9000	3715
S. S. Laird 73-B (568.53-ac)	2000	3626
S. S. Laird 89-B (568.53-ac)	1500	3634
W. E. Roberson 5 (30-ac)	2500	3690
Hurtle Oil Co., H. Sexton 2-B (102.37-ac)	240	3660
H. Sexton 13-B (102.37-ac)	185	3606
H. Sexton 14-B (102.37-ac)	150	3600
H. Sexton 16-B (102.37-ac)	275	3632
H. Sexton 19-B (102.37-ac)	400	3595
Kinso Oil Co. (was Mideast Prod.), C. Wells 3 (25.4-ac)	500	3652
Alex McCutchin et al, J. A. Beall 5 (47-ac)	480	3722
McCutchin & A. S. Wizon, Webb Kennedy 2 (25.7-ac)	500	3607
Max Rubin et al, A. Laird 1 (160-ac)	35	3505
Rudco Oil Co., W. G. Sexton-Vaughn 3 (20-ac)	750	3648
Rushwold Oil Co., Crews-Conoco 4-B (35.03-ac)	3500	3602
Harry Shulman et al, Kilgore townsite 1, blk 176	160	3525
Shell, J. S. King 10 (57.27-ac)	6500	3614
Sinclair Prairie, M. Kennedy 1-D (106.9-ac)	480	3615
Stewart Oil Co.-Perry Allen, A. Ferguson 1 (84.26-ac)	168	3512
The Texas Co., S. D. Walker 17 (213-ac)	1000	3590
Tide Water, J. S. Bean 18-A (128.44-ac)	3000	3635
M. G. Barton 29 (194-ac)	5000	3560
T. W. M. Oil Co., Sabine River 3, Tr. 1 (70-ac)	6000	3570
Weaver-Crim Corp., M. E. Peterson 3 (20-ac)	3000	3627
LONGVIEW AREA—		
Arkansas F. O. Co., Burnsides 33 (209-ac)	8800	3509
G. A. Castleberry 8-A (52.4-ac)	5000	3649
McKinley 16-A (96.74-ac)	7300	3610
Creslenn Corp.-Mayhughben Co., Widener 5 (98-ac)	700	3704
Bobby Manziel et al, Mackey 3-A (59½-ac)	1500	3730
I. B. Persky et al, A. Callahan 1-B (20-ac)	*	3741
Royalty Pet. Corp., B. A. Skipper 2 (18.4-ac)	*	3578
Selby O&G Co.-Lewis Prod. Co., Snavely 29-B (361.2-ac)	7500	3586
Snavely 34-B (361.2-ac)	7500	3574
Stanolind, McKinley 40-B (84-ac)	7000	3665
Willie Starr et al, Fee 1-A	2000	3615
Sun Oil Co., A. B. Mackey 2 (44.76-ac)	500	3690
Tide Water-Stanolind, A. J. Tuttle 11 (95.8-ac)	8400	3526
Tide Water, Arch Davis 18 (133.8-ac)	8300	3588
Wise & Jackson, A. Callahan 1 (55-ac)	150	3681
Ypsalanti Oil Co., L. T. Mackey 2 (20-ac)	4000	3688
ANDERSON COUNTY, (Cayuga Field)—		
Roeser-Pendleton, Inc., L. R. Billett 2-B (918-ac)	1500	4032
Ware-Wilson 4 (460-ac)	500	4033
HENDERSON COUNTY, (Cayuga Field)—		
Joe A. Worsham et al, J. & J. Wathen 1 (62-ac)	2000	4092
TITUS COUNTY, (Talco Field)—		
Humble, Myra Galt 1 (80-ac)	580	4349
Mary B. Groves 2 (82.9-ac)	1100	4355
LIMESTONE COUNTY—		
G. L. Rowley et al, Dean Hrs 1 (75-ac)	*	1845
TITUS COUNTY—		
C. M. Joiner Leasing Corp., Huensch 1 (1416-ac)	*	4644
SMITH COUNTY—		
Kelso & Thompson, McClung 1	*	3780

*Failures; †Junked; ¶Million cu. ft. gas.

New Field Looms

CALHOUN COUNTY WILDCAT PREPARES TO PERFORATE

WEEKLY STAFF REPORT

Corpus Christi. — Possible discovery of a new oil field in Calhoun County was still pending in the Corpus Christi sector of the Gulf Coast as the week closed. Saxet field's deep Frio sand was being further defined, and a 3300-foot west extension to the Saxet Heights field was being provided.

Humble Oil & Refining Company and Plymouth Oil Company's Patrick H. Welder 2, near Green Lake and two miles north of the town of Heyser in Calhoun County, was preparing to gun perforate casing which was set on bottom at 5474 feet. Sand was topped at 5452 feet.

Location of Welder 2 is in 1937.6-acre lease, J. M. Rios Survey and 3336 feet northeast of No. 1 Patrick Welder.

Continental Oil Company has spudded in Vandenberg 1 in section 12, black "H," Pedro Garcia survey and one mile north of wells previously drilled on the Seadrift block.

Southern Minerals Corporation's Mrs. M. B. Maston 1, 1100 feet north of the deep pay discovery well in the Saxet field, Nueces County, was still cleaning late in the week on a 5/32-inch choke, showing pressures of 600 pounds on the tubing and 600 pounds on the casing. Bottom of hole is 5824 feet and sand was logged 5803-24 feet with casing on bottom. The test promises to be the third deep sand producer in the field. Due east offset to Texon Royalty Scoggin 2, Renwar Oil Corporation's Rand Morgan 1 has set casing and is drilling in. The well logged sand at 4421-25 feet, showed 2000 feet of pipe line oil and 45 pounds pressure on a 15-minute drill stem test at 4415-25 feet. It is an edge well and will slightly extend the 4400-foot sand production. Southern Minerals Corporation's Rand Morgan 2, one mile west of the Saxet field, is ready to spud in. It is contracted to the 5800-foot sand. Two wells which were formerly abandonments are to be reworked and deepened. Paul Benedum et al have taken over Richardson and Thomas' Page Brothers 1, and derrick was being built to test the 5800-foot sand. The well is a wildcat test 3300 feet west of production in the Saxet field. Houston Oil Co.'s McGregor 2 in survey 311 is likewise erecting derrick to deepen to the 5800-foot sand.

May Extend Field

H. M. Reed's Katherine Quinn 1, probable 330-foot extension to the Saxet Heights field, is in the process of completion, showing considerable oil. Bottom of the hole is at 4117 feet. Seven-inch casing, set on bottom, will be gun perforated for production.

O W. Killam has been shut down for several days on Betty Ellich 1 on account of high water. The test is bottomed in shale at 3822 feet, with seven-inch casing set on bottom. It is 4000 feet south of the Clara Driscoll discovery well and is in section 109, Pauls subdivision of Driscoll Ranch.

Three miles east of the Whitepoint field in San Patricio County, Benedum and Trees' C. V. Jones 1 was washing over stuck drill stem with oil. Drill stem is stuck at 6270 feet, the total depth.

In section 19, Welder Ranch subdivision, 3½ miles northeast of Sinton, Benedum and Trees' Mrs. E. H. Welder 2 is drilling ahead below 6116 feet, where it was bottomed for several weeks while attempting completion.

South of Nursery in Victoria County, Rowan and Hope's A. W. Scheel was dry and abandoned at 6026 feet. The test is a wildcat in J. N. Esalera Grant.

Proven fields of Victoria County continued their active drilling supplying South Texas with three oil producers.

Operations in Refugio County remained steady with no outstanding development during the week.

Southeast 1175 feet of the discovery well of Mauritz field, Shell Petroleum Corporation's C. F. Combs 2 was dry and abandoned, total depth being 5852 feet. It is in section 33, Moriss and Cummings survey, Jackson County.

DEEP SAND CORED

In E. A. Graham's well north of Samfordyce

Mission.—A new deep oil sand was logged late in the week in E. A. Graham's Santos Villareal 1, located just north of the western part of the Samfordyce field, Starr County.

The test logged gas sand at 3025-32 feet and oil sand at 3032-42 feet which carried seven percent saturation. Shale was cored 3042-46 feet. Preparations are being made for a drill stem test.

About 800 feet north of Weyel's Woods 1, an abandoned test, Ed Leach's Wood Estate 1, was moving off location after abandoning well as a failure when the test blew wild and was out of control for some time. It was killed and is waiting on orders at 2740 feet. The test is three miles southeast of Rio Grande City, in Porcion 84.

A second producer for Mestinas field in Hidalgo County seemed prob-

able with Gulf States Oil Company's J. C. Engelman 3, lot 3, block 70, about 650 feet east of the discovery well, setting seven-inch casing at 6764 feet. Bottom of the hole is at 5812 feet. Oil sand was logged at 6706-29 feet and again at 6743-60 feet.

Quintan Petroleum Corporation had reached 8800 feet in shale and is coring ahead. This is one of the deepest wells ever drilled in the South Texas district and is holding keen interest in this sector. Nine thousand feet of 5-inch O. D. casing is reported to be on the rack.

Union Sulphur Company et al's American 7 in Mercedes field, Hidalgo County, is shut down for orders at 7608 feet after failing to swab or flow through perforations at 7540-49. The same company's American 8 set five-inch casing to 7822 feet and is waiting on cement, while American 9 is coring below 6763 feet.

Shell Petroleum Corporation's Yturria 1, projected 9200-foot wildcat in Willacy County, was coring at 4740 feet in shale.

ZAVALLA COUNTY
Enters spotlight of Balcones Fault zone

San Antonio.—With one well reaching the chalk and the remaining two active tests nearing critical depths, Zavalla County enters the spotlight of development along the Balcones Fault zone.

Leona Oil Corporation's George West 1, wildcat test in Zavalla County, topped the chalk at 5760 feet and was drilling ahead at 5825 feet in chalk. Derrick floor elevation is 740 feet. Location of the test is in C. Bustillo Survey No. 1, about three miles southeast of Buttram's Whitecotton 1, which is shut down at 4250 feet with a broken drive shaft. This well was originally contracted to 4200 feet, but will drill ahead to 6000 feet. Whitecotton 1 is in A. B. & M. Survey No. 1, offsetting Carmichael and George West Ranches. Bay Oil Corporation was making hole about 4500 feet in National Bank of Commerce 1, 16 miles southeast of Batesville in A. B. and M. Survey. It is in the southeast portion of Zavalla County.

In Atascosa County, Atascosa Trust (R. C. Lee, Trustee) U. A. Doumch 1 is ready to drill out cement plug after setting seven-inch casing at 3460 feet. Bottom of hole is 3519 feet and chalk was topped at 3503 feet. The well is three miles north of Poteet in Block 10, J. T. Russell Survey No. 122.

Termo Company of Texas was drilling below 2405 feet in J. L. Arp 1, wildcat test one mile west of Pearsall production in Frio County. In the Pearsall field Amerada Petroleum Corporation's W. H. Smith 2 is drilling below 4750 feet. It is in J. V. Mason Survey No. 322.

Zoboroski field of Guadalupe County was extended slightly east when Louis Crouch's J. Getzke 1 came in flowing by small heads an estimated 50 barrels of oil per day. The test is in J. D. Clements Survey, 550 feet east of Walton's Zoboroski 3. Same operator's Frank Zoboroski 1, plugged back from 2722 feet to 2210 feet in chalk and has run tubing. W. J. Walton et al's W. F. Krueger 1, H. Brand Survey, is in chalk and waiting on casing at 2176 feet.

Three miles southwest of the South Darst Creek field, Guadalupe County, Eickenroht and Gallagher's O. H. Jahns 1, Green DeWitt Survey, is drilling at 3134 feet in Buda lime topped at 3089 feet. Two miles northeast of Kingsbury, Paul Armstrong abandoned Clem Brodnaux at 2426 feet.

Five miles west of Vance and 14 miles southeast of Rocksprings in Edwards County, the hill country's lone test, Paul Teas' J. B. Stewart 1, was dry and abandoned in black shale at 5270 feet. It is located in the southeast quarter of Section 2, G.C.&S.F. Survey, in the southeast portion of the county.

COMITAS FIELD DEAL
Gilcrease buys holdings of Clover Oil and Gas

San Antonio.—A deal involving the major portion of the producing leases in the Comitas field, Zapata County, is reported with the completion of the first pipe line outlet for that 800-foot Jackson sand field.

Gilcrease Oil Company has acquired the properties of the Clover Oil and Gas Company on the A. P. Haynes ranch totaling approximately 700 acres out of the Comitas and Villa grants, upon which about eight wells have been completed as producers. The deal included the payment by the Gilcrease Oil Company to the seller of an amount equal to the total expenses of that company on these properties to date. Additional wells will be drilled and the Gilcrease Oil Company will be reimbursed out of production, after which profits will be shared 50-50.

This field has been provided an outlet through the construction of about four miles of 2½ inch pipe line by Zapata Pipe Line Company. This line connects with the Humble Pipe Line Company trunk system in the Escobas field. Zapata Pipe Line Company's line will serve all producers in the field. This company is composed of J. P. Nash, Leslie McKay and Norman Brown.

NEW WILDCAT PLAY
Started by location in Live Oak County

Beeville.—A new wildcatting campaign in the immediate vicinity of George West townsite has been opened by a new wildcat location staked by Dirks Brothers for George West Estate 1, Live Oak County. This test is 1361 feet from the southeast line and 340 feet from the northeast line of an 80-acre drilling block in George West Estate, one mile north of the townsite. Derrick is up and rig is being moved in.

Five and one-half miles northeast of George West, Dirks Brothers abandoned Agnes Throell at 3931 feet. An electric formation tester was run which encountered no shows.

Continuing in Live Oak County, in the extreme southwestern portion R. H. Feltner et al's John T. Carter & Bros. 1, went into the old hole at 2985 feet and set a whipstock at 2818 feet. It is drilling ahead below 2880 feet in new hole.

Location has been staked in Karnes County for Hickman et al's R. L. Barnett in the Alex Hunter survey, 4½ miles northeast of Karnes City. Materials are being moved in.

Diamond Half Oil Company completed E. G. Gillette's 1 in the J. Gomez survey of Goliad County for 199.5 barrels of oil per day on one-fourth-inch choke, showing pressure of 850 pounds on the tubing and 1000 pounds on the casing. Production is coming from sand 3660-68 feet, the total depth.

In Bee County, an attempt to widen the Dirks field one-half mile to the north failed when Illinois Petroleum Company abandoned Imogene Hall 1-C at 3928 feet. An electric formation tester was run to 3715 feet, and well then cored ahead to 3928 feet, showing salt water in the Yegua sand.

H. A. Pressey's R. T. Hicks 1, 4½ miles south of Normana, is coring ahead below 3503 feet after logging sand at 3482-87 feet and broken sand, shale and shells at 3487-2503 feet. On a 12-minute drill stem test at 3482-3502 feet the well showed 350 pounds of dry gas and 90 feet of mud.

A new wildcat location has been staked by Nichols & Quinn for J. R. Scott 1. It is 990 feet from the north line and 330 feet from the west line of block 7, Howeth and Swiger subdivision, Uranga Grant. The test is 1500 feet east of The Texas Company's Scott 4.

Following down trend into Jim Wells County, a drilling campaign is in progress due to the newly discovered Bentonville field. La Jita Corporation has staked location for W. E. Pope 1, 660 feet out of the southeast corner of Section 20. Likewise, Stanolind Oil & Gas Company's Frame Bowers 1 is a new location 330 feet out of the southeast corner of Section 14. Stanolind has a derrick up for E. W. Raney 1, Section 16, and for J. E. Saim 1, Section 18. Texon Royalty and Lucey Petroleum Corporation's Leona Dodd 1, diagonal northwest offset to Texon et al's Rolsten 1, discovery well of Bentonville field, is drilling below 3733 feet.

MIRANDO IS ACTIVE
Possibility of another field in Duval County

Laredo.—Activity remained steady in the Mirando District with Loma Novia, Lopez, Seven Sisters and Cole fields of Webb and Duval counties maintaining a heavy drilling campaign and adding 29 producers and seven failures to the week's South Texas completions. The initial flow of the oil wells was estimated at 15,509 barrels daily.

Work in Kepley Production Company's Clara Driscoll Sevier 1, key wildcat test and probable opener of new Government Wells sand field, was being delayed inasmuch as the well is shut down at 3410 feet waiting on a new swabbing machine. It is reported that the well is standing with about 600 feet of fluid in the hole. Location of Clara Driscoll Sevier 1 is in Section 71, Santa Rosalia Grant, block "D," and seven miles northwest of Driscoll field, Duval County.

Two miles east of Kohler field, Rio

Bravo Drilling Company et al's W. R. Peters 1 is drilling ahead below 1876 feet after encountering a gas sand at 1757-60 feet and a sand at 1807-18 feet which showed oil and gas. It is in Section 397, J. H. Gibson survey.

One mile south of Loma Novia field, Smith and Hamill's M. C. Hubberd 1, Section 69, was abandoned dry at 3024 feet.

An important location has been staked for a wildcat test by Illinois Petroleum Company, said test being J. H. Kirkpatrick 1, northwest of Lopez field. Location is 350 feet out of the southeast corner of the northwest quarter of Section 16.

LINE BEING LAID

Placedo market outlet runs to port district

San Antonio.—Placedo field, Victoria County, is receiving its first major outlet through construction of a pipe line by the Barnsdall Pipe Line Company to the Woods-Moore Corporation refinery at Port Lavaca. The pipe line, which will consist of two three-inch welded mains, will be 13 miles long, but will bring the crude to a point where it can be barged to deep water in the Corpus Christi port district.

The line will be ready for operation within a few days. It will handle considerable of the field's output, estimated at 65,000 barrels per day. Likewise, it likely will lead to further development of this apparently large producing area. The field has been rather choked for market, all of the oil being handled through tank cars. Several companies have large storage facilities.

Construction of this line will provide an adequate amount of production for the Port Lavaca refinery, which has been using crude from the Port Lavaca field, four miles away. This field, however, has been showing a slight decline in production and another source of production has been made necessary.

The Woods-Moore Corporation skimming plant has a capacity of 2000 barrels per day. As a result of the improved crude source, the plant will install a cracking unit. Products will be barged to Corpus Christi for coastwise shipment. This refinery is headed by Dale Moore and A. F. Wood.

Apex Construction Company is the contractor on the Barnsdall project.

HUMBLE OFFICE MOVE

Corpus Christi. — Confirmation was authoritatively given on the proposed concentration of divisional offices of the Humble Oil & Refining Co. in Corpus Christi. It was reported that the Humble has tentatively leased one floor of a local office building and agreed to occupy same by August 1. This move will affect some 35 families now living in Houston and San Antonio.

San Antonio.—The San Antonio Geological Society conducted a field trip in the vicinity of San Antonio April 30 for the general geology class of St. Mary's University, San Antonio. E. L. Porch, Jr., was in charge of the trip, assisted by Charles H. Rowe.

SOUTH TEXAS
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
BEE COUNTY—		
Illinois Pet. Co., Imogene Hall 1C, 990 ft nwl, 990 ft nel of 380-ac tr H. W. Fontaine sur, ½ mi n Dirks field	*	3928
The Texas Co., S. E. Young 16, T. J. Butler sur, (Dirks)	384	3941
BEXAR COUNTY—		
Nus-Wald O & G Co., S. Wetz Est 8, Stephen Jett sur 53 (Von Ormy)	9	620
W. H. Schaeffer Co., A. Mihaliski 2, 1070 ft sl, 680 ft wl of 98-ac tr, J. M. Butillos sur	*	850
CALDWELL COUNTY—		
Ogden & Reed Oil Co., Mamie Barber et al 2, Squire Damon sur (Dale)	50	2164
DUVAL COUNTY—		
Atlantic Oil, J. F. Welder hrs 11-D, sur 113, (Seven Sisters)	280	2486
Bridwell Oil Co., M. C. Hubberd 6-B, sur 75 (Loma Novia)	480	2662
Wm. Hubberd 16-C, sur 75, (Loma Novia)	576	2570
Duval Oil Corp., Bishop Cattle Co. 23, sur 59, (Loma Novia)	435	2541
Highland Oil Co., Wm. Hubberd 9, sur 75 (Loma Novia)	400	2569
Humble O & R Co., M. C. Hubberd 45-B, sur 72, (Loma Novia)	576	2739
Ruiz Est 11, sur 553, (Loma Novia)	260	2784
R. Serna, Jr. 8B, sur 384, (Seven Sisters)	604	2484
Magnolia Pet. Co., C. W. Hahl 2, sur 67, (Loma Novia)	432	2634
Ira G. Yates 1, 330 ft sl and el of sur 556	*	3949
Navarro Oil Co., J. F. Welder heirs 2, sur 383, (Seven Sisters)	1000	2457
Parr Oil Co., J. F. Welder heirs 3, sur 383, (Seven Sisters)	100	2455
Reliance O & R Corp et al, Drummond 1, sur 308 (Seven Sisters) (first hole)	*	2000
Drummond 1, sur 308 (Seven Sisters) (second hole)	1043	2538
Santa Clara Oil Co., J. F. Welder heirs 32, sur 383 (Seven Sisters).	842	2454
J. F. Welder heirs 7B, sur 383 (Seven Sisters)	686	2474
Shell Pet. Corp., M. C. Hubberd 22, sur 77, (Loma Novia)	1661	2729
V. Mendoza 7, sur 68 (Loma Novia)	580	2742
Smith & Hamill, M. C. Hubberd 1, 330 ft sl, 1650 ft el of sur 69 (1 mi s of Loma Novia field)	*	3024
The Texas Co., Bishop Cattle Co. 13, sur 59 (Loma Novia)	275	2547
Hugo Wendt 37, sur 68 (Loma Novia)	864	2682
Valley Osage Oil Co., Wm. Hubberd 5, sur 75 (Loma Novia)	346	2616
EDWARDS COUNTY—		
Paul Teas, J. B. Stewart 1, 725 ft nl, 350 ft wl, SE¼, sec 2, GC&SF sur	*	5270
GOLIAD COUNTY—		
Cotton Belt O & G Co., Lutenbacher, 330 ft nl and wl of blk 25 in Goliad Townsite, sec 4	*	5545
Diamond Half Oil Co., E. G. Gillette 1-C, J. Gomez sur (N. Pettus)	390	3668
H. J. Porter et al, J. R. Kauffman 1, 330 ft swl, 159 ft nwl of 40-ac lse, Trevino sur	*	lcn
GUADALUPE COUNTY—		
Paul Armstrong, Clem Brodnaux 1, 150 ft sl and el of 36-ac tr, Wm. P. King sur	*	2426
Louis Crouch, J. Getzke 1, J. D. Clements sur., (Zoboroski)	65	2300
A. D. Locke, J. S. Slaughter, 180 ft nl and wl of 105.3-ac tr in Cyrus Campbell sur	*	1050
HIDALGO COUNTY—		
Dean Bros., Mrs. Lula B. George 1, 230 ft wl, 150 ft sl of 10-ac out of s 90.11 ac of tr 13, porc 41, Reynosa Juris (extended field 700 ft n)	100	2754
Henshaw Bros. Seabury 1, share 256, Porc 38 (Samfordyce)	¶15	2788
JACKSON COUNTY—		
Shell Pet. Corp., C. F. Combs 2, Moriss & Cummings sur (Mauritz)	*	5852
JIM HOGG COUNTY—		
French Oil Corp., J. Vela Pena & Bros. 2, on common line of lots 18 and 19, c el and wl of sur 579	*	1636
LIVE OAK COUNTY—		
Dirks Bros., Agnes Throell 1, 330 ft swl and sel of 840-ac tr. Leal sur	*	3931
McMULLEN COUNTY—		
Aransas Oil Co., Ruckman 2, 660 ft wl, 150 ft sl of sur 69	*	1350
V. G. Schimmel Tr., Two Rivers Ranch 3, 330 ft sl and wl of sec 58	*	1146
Swearingen et al, Calliham Estate, M. Healy sur (Calliham)	*	1154
Wilkerson & Lightfoot, H. L. Lark 7, E. W. B. Scrugham sur (Calliham)	250	1038
MEDINA COUNTY—		
Gates & Hill, W. B. Odom 5, 160 ft wl, 960 ft nl 300-ac tr, H. Castro sur 174	*	329
NUECES COUNTY—		
J. K. Culton, Margaret Whelan 6, Villareal Gr (Saxet Heights)	750	4105
Tom Graham, City of Corpus Christi 1, Villareal Gr (Saxet Heights)	400	4050
Ed Flato 2, lot 14, H. B. Sheppard Farm lots (Saxet)	*	4864
W. A. Richardson et al, Stella Meredith 3, blk 10, Clarkwood Townsite (Saxet)	750	4423
Southern Minerals, F. J. Smith 4, blk 14, Sheppard Farm lots (Saxet)	575	4864
W. F. Stone, Trustee, L. F. Schleier et al 1-B, lot 13, Ellendale Gardens 3 (Saxet Heights)	850	4089
SAN PATRICIO COUNTY—		
Humble O. & R. Co., W. M. Belvey 1, lot 8, sec 35, fourth add Taft Farm Lands (Taft)	350	5640
J. W. Goodwin 1, lot 1, sec 23, third add. Taft Farm Lands (Taft) st/td 4005	650	6352
Plymouth Oil Co., E. H. Welder 43-C, sec 49, Welder Ranch subd. (Plymouth)	480	5650
E. H. Welder 44-C, sec 71, Welder Ranch subd. (Plymouth)	645	5649
Portillio Oil Co., E. H. Welder 1, 2000 ft nl and wl of sec 37, Welder Ranch subd. (1 mi sw Plymouth field)	*	6010
Shell Pet. Co., G. W. Pullin 1, sec 1, second add., Taft Farm Lands	460	4920
Willis Storm, Nancy Hobbs 1-A, 622 ft nwl, 621 ft swl of tr, M.P.J.&N. Delgado sur	*	7004
Sun Oil Co., J. M. Hunt 4, sec 34, Fourth Add., Taft Farm Lands (Plymouth)	365	5645
STARR COUNTY—		
Coreta Oil Co., N. Pena 1, 150 ft el & sl of share 80, porc 81, Camargo Juris	*	1500
Sun Oil Co., Chapotal Land 2, porc 99 (Samfordyce)	100	2822
St. Mary's O&G Co., D. O'Shea, 450 ft nl, 850 ft wl, sh 55, porc 71	*	510
TRAVIS COUNTY—		
W. Albrecht & F. Brinkrueger, M. C. Swenson 1, 750 ft sel, 850 ft nel of 75-ac tr, L. Kimbro League, sec 5	*	1280
VICTORIA COUNTY—		
J. & C. Drlg. Co., J. Janis 1, blk 8, Wm. Rupley sur (Placedo), perf 4738-43	264	4744
Rowan & Hope, A. W. Scheel 1, 330 ft swl & nwl of Scheel 195-ac tr in J. N. Esalera gr	*	6026
WEBB COUNTY—		
Mills Bennett, A. S. Billings 10, sec 113 (Lopez)	346	2150½
F. L. Garcia 6, sec 112 (Lopez)	288	2193
F. L. Garcia 7, sec 112 (Lopez)	600	2194
A. Montemayor 6, sec 114 (Lopez)	432	2167½
Cole Petr. Co., Rosa Benavides 97, blk 3, sur 7, Cole subd., Cuellar gr	*	3447
Magnolia Pet. Co., J. Benavides 6, blk 389 (Cole)	218	2886
S. Benavides 12, blk 390 (Cole)	218	2878
Otis Phillips, S. Benavides 2, blk 295 (Cole)	432	2849
Superior Oil Co., A. S. Billings 7A, sur 113 (Lopez)	550	2234
A. S. Billings 8A, sur 113 (Lopez)	530	2235
Texla Oil Corp., S. Benavides 1-D, W. H. Vernor, Tr., Jefferies Ranch blk 361 (Cole)	375	2887
1, 6750 ft el, 1170 ft sl, sec 1453, blk 13	*	1500
ZAPATA COUNTY—		
Clover O&G Co., A. P. Haynes 12, blk 7, Haynes subd., Comitas & Villa gr (Comitas)	50	880
The Texas Co., Whitehead 88, Cerrito Blanco gr (Escobas)	*	1276

*Failures; †Junked; ¶Million cu. ft. gas.

Two Mystery Tests

HOLD ATTENTION OF TEXAS GULF COAST OPERATORS

WEEKLY STAFF REPORT

Houston.—Attention of Texas Gulf Coast operators is focused on two wildcats, one in Orange County and the other in Chambers County; but the lamentable part of it, from the standpoint of scouts, is that both tests are "tight," that is, no official information is being given out by those doing the drilling.

Texas Canadian Oil Corporation's Bland 1, north of Orange field, J. Byson Survey, Orange County, was running an electrical logging device at the end of the week to 7104 feet. One report is that the well has sands showing oil from 7080 to 7104 feet, while another report states coring started at 7080 feet recovered but one foot of sand from 7103 to 7104 feet saturated with oil.

Bland 1 had a sand showing gas and salt water from 6756 to 6766 feet. It topped the Discorbis at 5503 feet, Heterostegina at 5810 feet, Marginulina at 6045 feet, and the Frio at 6305 feet.

The second mystery well is Glenn H. McCarthy's Pitts 1, Winnie prospect, J. M. Duran Survey, Chambers County. The well is reported to have had several showings of oil, but this information could not be confirmed. At the end of the week operators were reaming down to 7538 feet. The wildcat is running 100 feet higher than normal, it is said.

Tomball Extended

Tomball field, Harris County, was extended three-quarters of a mile northeast last week when Humble Oil & Refining Company completed Wilson 1 for 15 barrels per hour from sand at 5575 feet.

Wilson 1 is 4300 feet due east of Humble Oil & Refining Company's Juergens 1, J. House Survey and 7500 feet northwest of Mahaffey 1 in the J. Pruitt Survey. Juergens 1 and Mahaffey 1 were both oil producers. The nearest gas production is 2000 feet east of north.

Wilson 1 picked up the first sand at 5566 feet. After setting seven-inch casing at 5570 feet the well came in through a quarter-inch choke. Tubing pressure was 500 pounds; casing pressure was 750 pounds. The oil tested 40.6 gravity.

Tide Water Oil Company has made location on Cow Bayou prospect in Orange County for E. W. Brown 1. It is 375 feet east of Lake Shore road and 910 feet south of the intersection of Lake Shore road and Round Bunch road on the south side of Cow Bayou and on Dr. E. W. Brown's 7000-acre tract in the Mary Latham Survey. It is southeast of Orange field.

The prospect was worked with reflection seismograph in 1936 and a block of 12,000 acres was taken. The Brown estate covers approximately 9000 acres. Two-thousand acres were taken from W. H. Starks to complete the block, along with an additional 1000 acres leased from small land owners.

The operators are moving in a 136-foot steel derrick and extra heavy equipment. The well will be spudded next week.

Amelia field, Jefferson County, appeared likely to be extended 1155 feet west at the close of the week when Humble Oil & Refining Company was preparing to complete Pinchback 1 at 6768 feet in Frio formation.

Pinchback 1 encountered the gas sand from 6730 to 6751 feet and oil sand from 6751 to 6758 feet. Seven-inch casing has been set, and the crew will make a production test over the week end. Pinchback 1 is in the C. Williams Survey and west of the discovery well. It topped Discorbis at 5502 feet, Heterostegina at 5885 feet, and the Marginulina at 6050 feet.

In Lovall Lake area, Jefferson County, T. H. McFaddin was rigging up and moving in material on W. G. Burrell 1. It is 1146 feet east of the west line and 385 feet north of the south line of a 472-acre tract, or approximately 6400 feet south and 1147 feet east of the northwest corner of W. Smith Survey, Abstract 49.

Salt Dome Corporation's A. B. Lawrence 2, which recently was thought to be the discovery well for a new oil field in Chambers County, turned into a salt water well and was abandoned at 7300 feet after plugging back to 6820 feet and making another production test. The crew set five-inch liner, which later was perforated from 6650 to 6654 feet with 36 shots. After swabbing for some time the well showed salt water and a little gas. Lawrence 1 made 16 barrels per hour of 36 gravity oil April 16 from 6642 to 6661 feet, and then the flow changed to salt water.

Another wildcat was completed as a dry hole on the Dacus prospect in Montgomery County during the past week. Chapman & Smith's Delta Land Company 1 was abandoned at 5123 feet in rock after topping the hard formation at 5121 feet. The drill pipe was twisted off at 2320 feet. Delta Land Company 1 is in the northeast corner of T. Shepherd Survey.

Small Anahuac Extension

Anahuac field, Chambers County, was extended one location west May 15 when Sun Oil Company completed White 14 for 28 barrels per hour through a quarter-inch choke from Frio sands at 7087 feet. Tubing pressure was 1100 pounds; casing pressure was 1200 pounds.

White 14 drilled to 7087 feet and topped the oil sand at 7025 feet after failing to pick up the regular gas sand. The test is 737 feet west of White 12, J. McGehey Survey.

Humble Oil & Refining Company's Johnson 3, northwestern outpost test, 1087 feet east of Johnson 1, H. & T. C. Survey, section 47, was running seven-inch casing to complete at the end of the week. The bottom of the hole is at 7037 feet in shale. Top of the oil sand was found at 7037 feet.

The same company's Zappe 4, H. & T. C. Survey, section 51, was also running seven-inch casing at the close of the week. Zappe 4 encountered the oil sand at 7036 feet and drilled in the formation to 7088 feet.

Mid-Tex Oil Company's Security Trust Company 1, Willis prospect, G. W. Lewis Survey, Montgomery County, was abandoned last week after showing salt water in the Conroe horizon at 4547 feet. In the Upper Cockfield sand a drill stem test was made from 4252 to 4300 feet and it showed a large gas pressure. The well could have been completed as a gas well, but with no market for the production it was decided to abandon it. Salt water sand was cored from 4312 to 4320 feet. East of the abandoned hole it is reported that The Texas Company will drill a wildcat soon.

Humble Oil & Refining Company completed Cannon 2-B on the west side of Hastings field, Brazoria County, during the past week. It came in from

TEXAS GULF COAST

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
AMELIA—		
Humble, Quinn 1	768	6778
ESPERSON—		
General Crude, Davis 15	470	3588
FANNETT—		
Blue Eagle Oil Co., Junker 2	*	5837
HASTINGS—		
Humble, Cannon 2-B	703	6070
Stanolind, Cannon 3	618	5853
J. Sneed 1	528	6080
HULL—		
Gulf, Phoenix 103, (wo)	90	4067
PIERCE JUNCTION—		
Gulf, Manchester Corp. 3	210	4255
PORT NECHES—		
Texas Co., Polk B-6	*	6952
RACCOON BEND—		
Humble, Hardy 6	5	3785
Paine 12	1368	4128
Wilson 9	1296	4100
TOMBALL—		
Humble, Wilson 1	360	5566
Mahaffey 2	360	5552
WITHERS—		
Texas Co., Pierce Estate C-5	432	5567
CHAMBERS COUNTY—		
Salt Dome Oil Corp., A. B. Lawrence 2, Cotton Lake area, S. Barrow sur	*	7300
GALVESTON COUNTY—		
Coastal Minerals Dev. Co., M. J. Joslin 1, Friendswood area, S. McKissick sur	*	6506
MONTGOMERY COUNTY—		
Chapman & Smith's Delta Land Co. 2, Dacus area, T. Sheppard sur	*	5123
Mid Texas Oil Co., Security Trust Co., 1, Willis prospect, G. W. Lewis sur	*	4547

*Failures; †Junked; ¶Million cu. ft. gas.

TOTCO DRIFT RECORDER

PARTIAL LIST OF CALIFORNIA USERS

Associated Oil Co.
Bell & Loftland Co., Inc.
Drilling Exploration Co.
Ed McAdams
Hancock Oil Co.
Kettleman North Dome Assn.
North American Consolidated Oil Company
Ohio Oil Co.
O'Kane & Brain
Petroleum Securities Co.
Republic Petroleum Co.
Royalty Service Corp.
Shell Oil Company of California
Standard Oil Company of California
Taft Well Drilling Co.
The Texas Company
Union Oil Company of California
Wilshire Oil Co.
Wood-Callahan Oil Co.
W. O. Todd Drilling Co.

EXCLUSIVE AGENTS FOR
ARKANSAS • COLORADO • LOUISIANA
MONTANA • NEW MEXICO • TEXAS • WYOMING

THE CONTINENTAL SUPPLY COMPANY

EXHIBITING at The TULSA SHOW

EXCLUSIVE AGENTS FOR
KANSAS and OKLAHOMA

CARSON MACHINE & SUPPLY COMPANY

EXCLUSIVE AGENTS FOR CALIFORNIA

CALIFORNIA MACHINERY & SUPPLY COMPANY

MANUFACTURED BY
TECHNICAL OIL TOOL CORP., LTD.
1311 NORTH HAVENHURST DRIVE LOS ANGELES CALIFORNIA

PARTIAL LIST OF MID-CONTINENT USERS

Ajax Drilling Co.
Arrow Drilling Co.
J. B. Barnes
Bishop Oil Co.
Blackstock Oil Co.
Burke-Greis Oil Corp.
Byers Drilling Co.
Carter Oil Co.
Clark & Co.
J. E. Crosbie, Inc.
C. E. Davis
Eason Oil Co.
Francis Oil & Gas Co.
Franklin Drilling Co.
Hall & Briscoe
E. W. Jones, Inc.
Carl B. King Drilling Co.
Kirk-Green-Way, Inc.
Lynch Brothers
J. E. Mabee & Co.
Mannahan Drilling Co.
E. H. Moore & Co.
E. F. Moran
Southern Drilling Co.
Orville & J. O. Tilley
G. H. Vaughn Drilling Co.
Warren & Robinson

ACCURACY • AVAILABILITY • SPEED • SIMPLICITY • ECONOMY

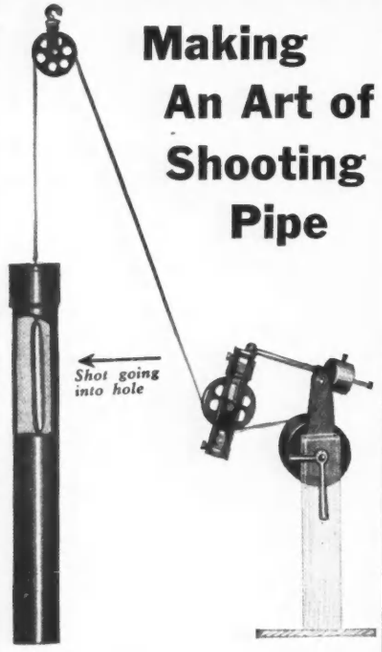
General Offices:

120 Broadway, New York

AMERADA PETROLEUM CORPORATION

Petroleum Building,

Tulsa, Oklahoma



Making An Art of Shooting Pipe

And Operators are coming to the H. & L. Method as Standard

Small brass shot tubes are used in shooting off stuck drill pipe. Large tin shot tubes are used in shooting out casing window for sidetracking or shooting off casing for pulling. The explosive is 100% gelatine, and pressure equalization is effected to prevent premature shot. Depth or temperature are therefore no longer obstacles to H. & L. Well Shooters.

HALL & LOWREY INCORPORATED
PHONES: OFFICE 222—NIGHT 122—354
GOOSE CREEK, TEXAS, U.S.A.

M. C. WOMACK (Phone 89) Thibodeaux, La.

6070 feet flowing at the rate of 703 barrels daily through a quarter-inch choke. Tubing pressure was 850 pounds; casing pressure was 885 pounds. Gas oil ratio was 346 to 1. Cannon B-2 topped the sand at 6040 feet. Seven-inch casing was cemented at 6042 feet. Cannon B-2 is in the H. & T. B. Survey, section 36.

Stanolind Oil & Gas Company added another producer to Hastings field. Cannon 3, H. & T. B. Survey, section 36, was completed at 5853 feet for 206 barrels in eight hours through a quarter-inch choke. Tubing and casing pressures registered 915 pounds. The oil sand was encountered at 5615 feet. Seven-inch casing was set at 5618 feet.

Coastal Minerals Development Company's M. J. Joslin 1, Friendswood prospect, east of Hastings field, S. McKissick Survey, Brazoria County, was abandoned last week at 6506 feet after coring salt water sand. Top of the broken sand was found at 6436 feet and the top of the salt water sand at 6450 feet.

Texas Gulf Producing Company cored salt water in Sparks 1, Angleton prospect, Brazoria, County, during the past week from 6227 to 6237 feet, and at the end of the week the operators were drilling ahead below 6242 feet. This is the second salt water sand the well has cored. The first salt water sand was encountered from 3950 to 3951 feet. Texas Gulf Producing Company's Sparks 1 is located in the Wm. Roberts Survey.

Humble Oil & Refining Company's Townes 3, 800 feet southeast of Townes 2, Dickinson field, J. S. Jones Survey, Galveston County, was running seven-inch casing to 8045 feet at the close of the week to make a production test.

Last week the company cored sand and shale with streaks of sand from 7999 to 8085 feet. On a drill stem test from 7985 to 8045 feet, with the seat set at 7985 feet, Townes 3 showed a pressure of 570 pounds and seven thribbles of clean oil, seven thribbles of gas and oil cut mud and 28 thribbles of gas cut mud. The test was made in 15 minutes.

Humble Oil & Refining Company's Maco Stewart 7-B, J. Sellers Survey, Dickinson field, was also running seven-inch casing at the end of the week. The operators cored an oil sand at 8015 to 8035 feet.

Two new locations were made by Humble Oil & Refining Company in Dickinson field. Magel 3 is 900 feet west of Magel 2, J. S. Jones Survey. Maco Stewart A-8 is 883 feet northeast of Maco Stewart A-7, 408 feet northwest of Maco Stewart 1, and 175 feet south of Dickinson Bayou in the J. Sellers Survey.

Van Vleck Test

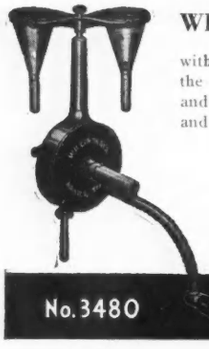
Skelly Oil Company's Langham 1, M. Cummings Survey, Van Vleck field, Matagorda County, looked disappointing last week when it flowed salt water from the deep sand at 7500 feet.

While drilling Langham 1 to 7505 feet an oil sand was encountered at 7497 feet. Seven-inch casing was set on bottom and perforated with 85 holes from 7480 to 7500 feet. Langham 1 flowed salt water and a little oil. A squeeze job was completed with 25 sacks of cement and the perforations were plugged. At the end of the week the casing had been perforated again from 7460 to 7475 feet with 40 shots, and May 15 the operators were washing the well in. Top of the Discorbis was found in Langham 1 at 5770 feet Heterostegina at 6240 feet, and Marginulina at 6640 feet.

Skelly Oil Company has made location for Cobb B-7 in Van Vleck field. It is 740 feet south of the north line and 2065 feet east of the west line of the M. Cummings Survey.

The fifth oil producer was completed in Withers field, Wharton County, during the past week by The Texas Company when Pierce Estate C-5, J. Caldwell Survey, was finaled at 5567 feet for 540 barrels of 26.1 gravity oil daily through a quarter-inch choke. Tubing pressure was 725 pounds and casing pressure was 775 pounds. Top of the oil sand was encountered at 5540 feet and seven-inch casing was cemented at 5555 feet.

Hawkeye Petroleum Company has announced location for a wildcat two miles northwest of Livingston field, Polk County. W. F. Harder 1 is 466 feet from the north and east lines of the north corner of a 100-acre tract, or approximately 24,800 feet from the northeast line and 4400 feet from the northwest line of the A. Viesca Survey.



B. S. and W. Tests Made Quickly—Easily
WITH THIS IMPROVED CURTIN CENTRIFUGE

with these machines you can maintain the required speed for the period of the test with much less effort. They are heavy duty type, rigidly constructed, and extremely simple in design. The cranks and heads for 15 c.c. and 100 c.c. machines are interchangeable.

Ask for this Bulletin giving details and prices on all CURTIN Centrifuges and Tubes.

Address Inquiries to Dept. A

No. 3480 W. H. CURTIN & COMPANY, INC.
HOUSTON, TEXAS

SOUTH LOUISIANA
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
CALLIOU ISLAND—		
Texas Co., Caillou Island 38	1187	3935
IOWA—		
Shell-Stafford 7	500	6732
JENNINGS—		
Reed Crude Oil Co., Heywood 9	65	3087
LEEVILLE—		
Gulf, Allen Land 9	964	3738
ROANOKE—		
Humble, Taylor 3	336	8850
SORRENTO—		
Pan American Production Co., United Lands 4	¶2½	4332
ST. MARTINVILLE—		
Tide Water, Smede 2	¶2	6650
SULPHUR—		
Union Sulphur, Fee 767 (wo)	948	4017
Fee 826	598	3763
TEPETATE—		
Continental, Sonnier 1	492	8317
EAST FELICIANA PARISH—		
East Feliciana Oil Corp., Rider 1, sec 58-1s-1w	*	lcn.

*Failures; †Junked; ¶Million cu. ft. gas.

LOUISIANA IS DULL
Two Shell wildcats hold attention of operators

Lake Charles.—The Louisiana sector of the Gulf Coast witnessed a dull week during the seven-day period ending May 14; only routine developments were shown in the fields and with wildcats drilling at unimportant depths.

Shell Petroleum Corporation's two wildcats, one in Jefferson Davis Parish and the other in St. James Parish, were probably the two most important tests drilling in the area. Lacassine 1, Hayes prospect, Section 20-11s-5w, Jefferson Davis Parish, was setting a protection string of seven-inch casing at 9523 feet, while Colonial Sugar 1, Convent prospect, Section 5-12s-5e, St. James Parish, was drilling in shale at 7015 feet at the close of the week. Lacassine 1 has been showing gas with the hole heaving, and this forced the operators to set the casing. Colonial Sugar 1 has had no showings of oil since 6829 feet.

Magnolia Petroleum Company's Hebert 1, approximately one mile south of the discovery well at Big Lake, Section 13-12s-9w, Cameron Parish, was drilling in shale at 6630 feet last week after encountering a sandy shale with an oil odor from 5809 to 5815 feet. The well will be drilled on down below 8000 feet to test the sands which were found in the discovery well, which is producing from 7944 to 7966 feet. It also had showings of gas and distillate from 8020 to 8026 feet.

Tide Water Oil Company recently purchased a large spread of acreage around Venice dome in Section 26-21s-30e, Plaquemines Parish. It is reported the company will drill a well on this acreage soon. Southern Sulphur Company's Manhattan Fruit Company 1, Section 26-21s-30e, has been shut down for some time at 3510 feet. The well cored a sand with an oil odor from 3124 to 3127 feet and from 3229 to 3230 feet.

On the Cankton prospect, northeast of Bosco, Limited Oil Company's Miller Estate 1 was drilling in shale at the end of the week at 7630 feet. Miller Estate 1 topped the Discorbis at 7394 feet and is reliably reported to be running high. However, no official information is being given out on the test as it is strictly a "tight" wildcat. Southwest of Miller Estate 1 and on the northeast side of Bosco field, Superior Oil Producing Company's Guilbean 1, Section 26-8s-3e, topped the Discorbis at 7831 feet. Comparison of the two markers might be taken to indicate that a dip or graben is between the two structures. Shell Petroleum Corporation and Superior Oil Producing Company have interest in the wildcat, with Superior Oil Producing Company attending to the drilling operations. Miller 1 is 1500 feet south and 230 feet east of the northwest corner of Section 47-8s-4e, St. Landry Parish.

East Feliciana Oil Company abandoned the location for Rider 1, East Feliciana Parish, and is going to make location for another test. Rider 1 was located 12,100 feet south and 3000 feet west of the northeast corner of Section 1s-1n, but in Section 58-1s-1w.

General Crude Oil Company's Vincient 1 evidently mised the regular producing sand at 8300 feet in Tepetate field, Acadia Parish. At the end of the week the crew was drilling in shale at 8708 feet. Vincient 1 probably will be carried down to the Vicksburg formation, plugged back to 7340 feet, and test sands from 7375 to 7425 feet which showed from five to eight ohms on an electrical logging device. General Crude Oil Company's Vincient 1 is over two miles west of the field and is in Section 31-7s-2w.

Continental Oil Company completed A. Sonnier 1 at Tepetate last week at 8317 feet. It came in for 492 barrels daily through a quarter-inch choke. Tubing pressure was 2100 pounds; casing pressure was 2400 pounds. The oil tested 35.6 gravity. Gas sand was topped at 8238 feet and oil sand at 8298 feet. Five and three quarter-inch casing was run to bottom and perforated with 12 holes from 8310 to 8316 feet.

Continental Oil Company's P. O. Johnson 1, also in Tepetate, was waiting on 5¾-inch casing to set at the end of the week. The casing was set at 8317 feet in oil sand and will be perforated for a production test. Johnson 1 failed to pick up the gas sand and encountered the oil sand at 8392 feet. It is in Section 29-7s-2w.

John B. Bech has made location for Realty Owners 1 on the Houma Townsite prospect in Terrebonne Parish. The wildcat is 3925 feet from the northeast corner of Section 103-17s-17e. Realty Owners 1 is near Shell Petroleum Corporation's Realty 1, which was abandoned at 10,157 feet.

R. Dobes et al are rigging up on Buhler 1, a deep test near the Buhler fault in Gillis field, Calcasieu Parish. The test is 465 feet west and 150 feet north of the southeast corner NE¼ NE¼ of Section 11-9s-8w. Union Sulphur Company's State 16 is located 1110 feet north and 1443 feet west of the southeast corner of the NE¼ of Section 11-9s-8w.

A Short Story of Power Plant Progress

THE ANTIQUATED METHOD

TOTAL WEIGHT-HUNDREDS of POUNDS

BUT NOW

THE MODERN SAND-BANUM WAY

A 16-OUNCE CAN ALL ACTIVE INGREDIENTS

In the inevitable March of Progress can be heard the vibrant throb of Sand-Banum. It is as modern as tomorrow yet its principle is as old as the formation of matter. Standardization on Sand-Banum has increased the Efficiency and Economy of Operation in every power plant in which it has been employed!

In its Simplicity lies its power! **It comes ready for use in 16 OUNCE CANS and is applied only one to four times per month. Containing none of the usual "boiler chemicals" it is absolutely harmless to equipment and persons. It removes old scale and corrosion by its mechanical-colloidal action that causes all formation to disperse into a soft sludge that is easily blown off. It prevents future formation by holding all water impurities in suspension so that it is impossible for them to crystallize.**

There is no need for shut-downs, turbining and tube replacements, or water analyses with Sand-Banum on the job. Sand-Banum does a better job—that is why it is always sold on a "Satisfaction or No Money" guarantee.

VISIT BOOTH 101 — Texas Building — *and*
be convinced of its Superiority and Economy

AMERICAN SAND-BANUM COMPANY, Inc.
342 Madison Avenue **New York City**

Stocks carried by
WESTERN SAND-BANUM COMPANY
Houston, Texas **Denver, Colorado** **Fresno, California**
and at other convenient points including leading supply houses.

Wide Extension

RODESSA PRODUCTION MOVED OVER 4 MILES IN TEXAS

NORTH LOUISIANA

WEEKLY STAFF REPORT

Shreveport, La.—Opening up more than 4000 acres of potentially productive territory, American Liberty Oil Company's Rambo 1, J. H. Rives Survey, Cass County Texas, was completed in the Young oil horizon at 6010 feet last week to extend the limits of Rodessa producing field 4½ miles southwest. Rodessa field now extends for over 16 miles in a northeast-southwest direction from this well to Lion Oil Refining Company's J. M. Wynn 1, Section 9-23n-15w, Caddo Parish, northeast outpost well, which is a gas-distillate producer.

American-Liberty's Rambo 1, which was drilled to 6073 feet, was plugged back to 6010 feet and seven-inch casing was cemented at 5993 feet; elevation is 260 feet. Forty-one feet of porous formation was logged from the Dees and Young horizons, the upper 38 feet showing gas and distillate and the lower three feet having a show of gas, distillate, and oil. Casing was cemented five feet above base of the porous zone.

Rambo 1 logged top of the Hill zone at 5680 feet and top of the Young was identified at 5982 feet. Massive anhydrite was logged from 5292 to 5530 feet. Top of the red beds was logged at 3330 feet, which was 80 feet higher than this marker in United Gas Public Service Company's I. L. Young 1, SE SE 21-23n-16w, first oil well at Rodessa.

The Cass County extension producer was completed May 11, and after heading at the rate of five barrels of oil and wash water per hour through one quarter-inch choke a short time, was closed in while tankage was erected as the well had been expected to be a gas-distillate producer, being thought by many to be too near the Rodessa fault to make an oil well, and having checked with gas producers on top of the Rodessa structure around Section 23-23n-16w. Tubing pressure at that time was 1300 pounds and casing pressure, 1375 pounds.

The well was re-opened May 13 and flowed at an estimated rate of eight barrels of oil per hour through quarter-inch tubing choke, but later, after cleaning itself, was flowing 20 barrels per hour through the same choke, with a tubing pressure of 900 pounds and a casing pressure of 800 pounds. The well is making an estimated 2,500,000 cubic feet of gas daily with the oil.

38 Locations Near Test

Thirty-eight locations and tentative locations have been made in the vicinity of the extension well and Cass County is expected to get its full share of drilling as a result of the well's completion.

Two of the most interesting locations announced were Marathon Oil Company's R. P. Willis 1, (320-ac), in the S. F. I. W. Company No. 1025 Survey, 1¾ miles northwest of Rambo 1, and Superior Oil Company's T. H. Stallcup 1, James Davenport Survey, one half-mile west of the new well.

Herman Brown of Dallas, plans a series of nine tests on the R. P. Willis 60-acre lease, Robert Trammell Survey; one mile northeast of the new producer. One and one fourth-miles west of the new well, Vaughn Production Company plans a similar number of early tests on the 60-acre R. P. Willis tract in the S. F. I. W. Survey. M. H. Marr of Shreveport plans four tests a quarter of a mile north of the producer, Baugus 1 and 2, and Lula Sheppard 1 and 2. North of the well, David M. Lide and associates plan six tests on the J. L. Baugus and S. L. Baugus tracts. Phillips Petroleum Company plans six locations on the 61-acre T. H. Stallcup tract, Robert Trammell Survey. O. J. Rowe plans two tests on the Ida L. Spell tract to the north of Rambo 1. Gulf Oil Corporation plans location for its Rambo 1, 86-acre tract. Others owning nearby acreage include Arkansas-Louisiana Gas Company, H. L. Hunt, Incorporated, United Gas Public Service Company, Sun Oil Company, United Production Corporation, and Tidewater Oil Company.

A great deal of geophysical activity persisted in Cass and Marion Counties before the extension well was completed and there may be additional crews sent into that general area. Amerada Petroleum Corporation's shooting unit is working north of Jefferson in the W. T. Bush and adjacent surveys. Atlantic Oil Producing Company has a seismograph unit working between Jefferson and Lodi and a torsion balance unit tracing the Rodessa Fault five miles west of Jefferson. Texas-Seaboard Oil Company has a shooting unit at work north of Linden, Cass County.

Daily production for Rodessa for three days last week showed the following: from 164 wells, 53,289 barrels; from 166 wells, 58,521 barrels; and from the same number of wells, 58,183 barrels. The average for the week ending May 13, was 54,537 barrels daily, not including runs from Pelican Oil & Gasoline Company's 13 Sexton wells, which were 15,648 barrels and 17,225 barrels, respectively, for May 12 and 13.

13 Completions

Thirteen new producers, one of which extended the producing limits of the field

"Does PELCO handle . . . . . ?"

Pardon us for interrupting, but PELCO handles everything for drilling and producing an oil well. Not every brand, naturally. But the best, we think, and we think in terms of design, metallurgy and heat treatment. A lot of drillers and producers and engineers respect our judgment and our ingenuity for getting and having what a man needs to get the job done. Have, in fact, for 25 years. And next to old customers, we are very fond of new ones.

Everything Needed to Drill or Produce an Oil Well

PELICAN

WELL TOOL & SUPPLY COMPANY

SHREVEPORT, LOUISIANA

PELCO

Lake Charles—Houma—Converse
Rodessa—Monroe—Kilgore
Greggton

one half-mile southeast in the townsite part of the field, besides the four and one half-mile extension into Cass County, Texas, were completed in Rodessa last week setting a new high record for completions in one week in the field. This gives the field 169 oil producers.

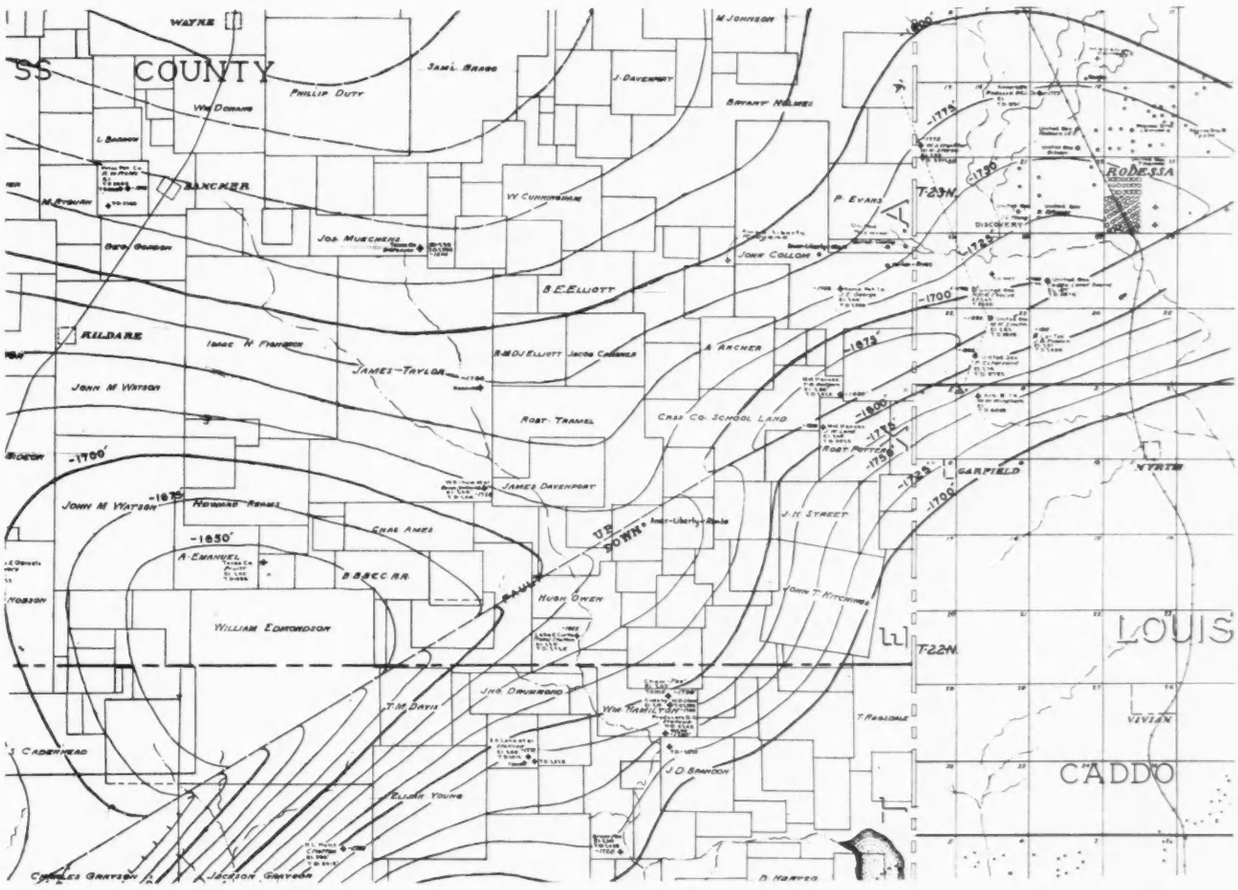
Besides American Liberty Oil Company's Rambo 1, the completions were: Arkansas-Louisiana Gas Company's Rodessa 12, Section 22-23n-16w, completed at 6010 feet, flowing 25 barrels per hour through quarter-inch tubing choke; Arkansas-Louisiana's Rodessa 14, Section 23-23n-16w, completed at 6014 feet flowing 20 barrels per hour through quarter-inch tubing choke; Delta-Jones Ashley 1, lot 6, block 13, Rodessa townsite, Section 23-23n-16w, completed at 6016 feet, flowing 119 barrels of 57.8 gravity oil in 20 hours through 5/16-inch tubing choke; W. F. Lacey's J. Tyson 1, NW SE NW 24-23n-16w, completed at 5997 feet flowing seven barrels of distillate per hour along with 12 million cubic feet of gas through quarter-inch tubing choke, extending the producing limits of the field one-half mile southeast; Standard Oil Company of Louisiana's S. G. Zylks 1, SW SW 10-23n-16w, an east offset to the same company's O. A. Zylks 1, SE SE 9-23n-16w, completed for 80 barrels per hour by Haynes Production Company before it sold its holdings to the Standard to extend production one mile west of the north limits of the field.

Marr and Perkins completed Hunter 5, Section 13-23n-16w, at 6078 feet making 10 barrels per hour through three eighths-inch tubing choke with 1000 pounds tubing pressure and 750 pounds casing pressure. R. W. Norton completed Atkins 2, NW NE 18-23n-15w, a west offset to a north outpost well in the eastern offshoot of the field, flowing 10 barrels per hour through quarter-inch tubing choke at 6040 feet. The same operator's Levee Board A-4, Section 21-23n-16w, was completed at 5992 feet flowing 35 barrels per hour through quarter-inch tubing choke with 850 pounds casing pressure. In the north edge of production, Standard Oil Company of Louisiana completed Pitts A-3, Section 11-23n-10w, flowing 84 barrels per hour through 1¾-inch tubing choke at 6033 feet, with 250 pounds casing pressure. United Gas Public Service Company's Thomas 4, Section 23-23n-16w, was completed at 6021 feet flowing 72 barrels per hour through half-inch tubing choke, with a tubing pressure of 350 pounds and a casing pressure of 250 pounds. Drillers, Incorporated, (S. P. Borden et al) completed a south edge well in the Rodessa townsite, K. C. S. Railway 1, Section 23-23n-16w, flowing 60 barrels of oil per hour through three eighths-inch tubing choke, at 6008 feet. In the northeast offshoot of the field, Phillips Petroleum Company (Bartex) completed Norton Estate 4, Section 17-23n-15w, at 6008 feet, flowing 355 barrels in 15 hours through quarter-inch tubing choke.

The Cass County, Texas, side of the field apparently is assured of another early producer in American Liberty Oil Company's Maxie 2, John Collum Survey, a west offset to the same company's Maxie 1, which recently extended the field one and one half-miles west. Maxie 2, with total depth of 6045 feet has had seven-inch casing cemented.

One half-mile west of Lion Oil Refining Company's J. M. Wynn 1, Section 9-23n-15w, northeast outpost producer, Blackwell Oil & Gas Company's Neugent 1, SW NE SE 8-23n-15w, was reaming at 6107 feet. This test had at 5927-33 feet the best oil showing so far in Rodessa in the Hill horizon. In the northeast offshoot of the field American Liberty Oil Company is rigging for W. N. Norton 1, NEc 17-23n-15w.

In the Rodessa field, Section 14-23n-16w, Pelican Oil & Gasoline Company's casing head plant last week produced 1000 gallons of casing head gasoline from 40 million feet of gas per day. Normally this much gas should produce twice that amount, but the first run was reported to have required that the material be re-



Map of the Rodessa area showing American Liberty Oil Company's Rambo 1, in Cass County, Texas, extending the field 4½ miles. Contours on top of the Saratoga chalk. A similar map in larger detail, and also by Keith A. Spitznagle, was published in The Oil Weekly, August 26, 1935, page 26.

treated. North Caddo Refining Company is building a 10-car loading rack.

Bottom Hole Pressure Drops

Bottom hole pressure on wells on the Louisiana side of the Rodessa field has dropped an average of 100 pounds during the last 60 days, according to a series of tests conducted on key wells. One key well near the Pelican Oil & Gasoline Company's lease of 120 acres in Section 14-23n-16w, which is reported to be running over 17,000 barrels daily from 13 wells under a special order of the minerals division, Louisiana Conservation Commission, was reported during the 60-day period to have shown a drop of 190 pounds in bottom hole pressure.

The main factor to which the drop in pressure is attributable is the large amount of gas that escapes from oil producing wells in the field, this being estimated as high as three hundred million cubic feet daily.

New Sugar Creek Sand

A new producing horizon was uncovered last week in the oolitic lime of the Glen Rose in Sugar Creek gas field, Claiborne Parish, which for several years has been producing a wet gas from 4300 to 4500 feet in that horizon. The new producing horizon at 5541 to 5551 feet yielded a 4,976,000 cubic feet wet gasser in Sugar Creek Syndicate and associates' Kilpatrick 1, SW NE 7-19n-5w, which was deepened from the 4500-foot level after another 9000-foot test showed gas at the lower level. Rock pressure is 2310 pounds. The new gas producing horizon is probably correlated with the Young at Rodessa.

The second Young horizon saturated gasser in the Sligo gas field, Bassier Parish, was completed last week in United Gas Public Service Company's Murff A-1, Section 17-17n-11w, a quarter of a mile west of Producers Oil & Gas Company's Pettit 1 in the same section a well which was completed at 5199 feet as a saturated gasser to open this new horizon at Sligo. United's Murff A-1 gauged 41,600,000 cubic feet of wet gas with rock pressure of 2150 pounds. Total depth was 5409 feet, but the well had been plugged back to 5130 feet and seven-inch casing cemented at 4930 feet.

United Gas Public Service Company has made location for Skannal D-1, SE NE 22-17n-12w, and Producers Oil & Gas Company has made location for J. A. Skannal Estate 1, SW SW 22-17n-12w, both down on the southwest part of structure.

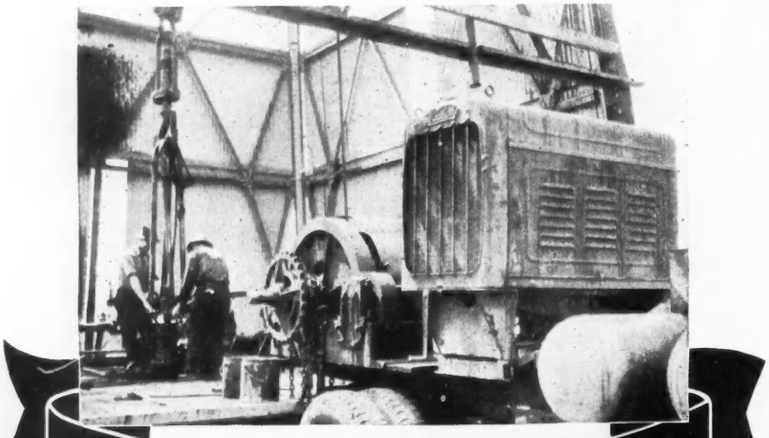
LOUISIANA PERMITS

Shreveport. — Thirteen drilling permits were authorized last week by the minerals division, Louisiana Conservation Commission. Six were in North Louisiana divided among the following parishes: Caddo, 4, of which 3 were for Rodessa; Sabine, 1; and Union, 1. The 7 in South Louisiana were in the following parishes: Acadia, 1; Calcasieu, 2; Iberia, 2; Jefferson Davis, 1; and Plaquemines, 1.

NORTH LOUISIANA
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
BOSSIER PARISH, (Sligo)—		
United Gas Pub. Serv. Co., Murff A-1, 17-17n-11w	¶41	5409
CLAIBORNE PARISH, (Sugar Creek)—		
Sugar Creek Synd. et al, Kilpatrick 1, 7-19n-5w	¶4	5811
CADDO PARISH, (Rodessa)—		
Ark-La. Gas Co., Rodessa 12, 22-23n-16w	4000	6010
Rodessa 14, 23-23n-16w	3600	6014
Delta-Jones, Ashley 1, 23-23n-16w	1000	6016
W. F. Lacey, J. Tyson 1, 24-23n-16w	¶12 and 1000	5997
Marr & Perkins, Hunter 5, 13-23n-16w	2000	6078
Magnolia Pet. Co. (R. W. Norton), Atkins 2, 18-23n-15w	2000	6040
(R. W. Norton), Levee Board A-4, 21-23n-16w	4000	5992
Standard Oil Co. of La., S. G. Zylks 1, 10-23n-16w	1500	6000
Pitts A-3, 11-23n-16w	4000	6033
United Gas Pub. Serv. Co., Thomas 4, 23-23n-16w	4000	6021
Drillers, Inc., K. C. S. Ry. 1, 23-23n-16w	4000	6008
Phillips Pet. Co., Norton Est. 4, 17-23n-15w	1500	6068
CASS COUNTY, (Texas) Rodessa—		
American-Liberty Oil Co., Rambo 1, J. H. Rives Survey	2000	6010
DE SOTO PARISH—		
A. G. Halbach, Tr, Staten 1, 32-13n-14w	*	4003
CADDO PARISH, (Pine Island)—		
Juan et al, Hobbs 1, 28-21n-15w	15	1669
MOREHOUSE PARISH, (Monroe)—		
United Gas Pub. Serv. Co., Crossett Lbr. Co. 36, 27-21n-4e	¶10	2251
Crossett Lbr. Co. 38, 27-21n-4e	¶6½	2179
Tensas-Delta 20, 9-21n-4e	¶5	2182
SABINE PARISH, (Converse)—		
Windsor Oil Co., Cassell 1, 30-9n-13w	200	1752
UNION PARISH, (Monroe)—		
Southern Carbon Co., Fee 69, 8-21n-4e	¶10	2160

*Failures; †Junked; ¶Million cu. ft. gas.

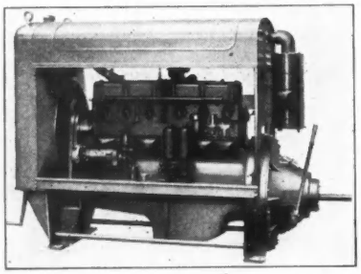


BETTER SERVICING

with WAUKESHA power

This Hopper Servicing Hoist... driven by a 90-112 hp., six cylinder, Model DHKU Waukesha Oil Well Servicing Engine... mounted on an oil field truck... is cleaning wells in the "Weedpatch" field near Bakersfield, California.

Built to meet the demand for modern power units that will stand up under the severe conditions encountered in oil field service, Waukesha Oil Well Servicing Engines range in size from 40 hp. to 112 hp., and burn either gas or gasoline. Their design embodies many advanced features. Bulletin 1019 gives the details... Write for it. *Waukesha Motor Company, Waukesha, Wisconsin.*



SEE YOU AT THE INTERNATIONAL PETROLEUM EXPOSITION 1936 WORLD'S FAIR OF THE OIL INDUSTRY TULSA, U.S.A. MAY 18 TO 31

AT THE SHOW
BLOCK J
WAUKESHA BLDG.

WAUKESHA ENGINES

THREE LOCATIONS

Follow completion of Ouachita County test

ARKANSAS

WEEKLY STAFF REPORT

El Dorado, Ark.—Phillips Petroleum Company, which recently completed J. D. Reynolds 1, SE NW 27-15-15, Snow Hill, Ouachita County, one mile northeast of the shallow Smackover field, has staked three locations offsetting this gas-oil producer which was completed at 4926 feet in top of the Permian lime to add that formation to the list of oil-gas producing horizons in Arkansas.

The new locations are: J. T. Arnold 1, 330 feet east of west line and 660 feet south of north line west half of the northeast quarter 27-15-15; Berg 1, 330 feet east of west line and 660 feet south of north line east 20 acres of NE SE 28-15-15; and E. Gette 1, 600 feet south of north line and 330 feet west of east line of north half SE 28-15-15. Arnold 1 and Berg 1 are rigging up.

Standard Oil Company of Louisiana and Arkansas-Louisiana Gas Company are planning early tests near the new producer. Phillips previously made location for Mary Murphy 1 and 2, NE NE 28-15-15, and Lion Oil Refining Company for Reynolds-Berg 1, SE NE 28-15-15.

Latest gauge on J. D. Reynolds 1 shows the well making 9½ barrels of 43 gravity oil per hour through half-inch tubing choke on 2½-inch tubing with casing pressure of 950 pounds, along with 41,000,000 cubic feet of gas daily, one-half percent mud shake-out.

It is announced that Louisiana Supply Company, which recently bought Simms Oil Company's 3000-barrel cracking and skimming plant at Smackover for $55,000 cash, also acquired an estimated 1,000,000 barrels of steel storage in the trade which will be of considerable value if a new oil development program of magnitude develops from the Permian lime discovery.

El Dorado, Ark.—Only one drilling permit was authorized last week by the Arkansas Board of Conservation, as follows: Dallas County, Kel-Mac Lease & Royalty Company, Beaumont, Texas, Ray Owens 2, 300 feet south and east NWc NW SW 26-10-16.

ARKANSAS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
OUACHITA COUNTY, (Snow Hill)—		
Phillips Pet. Co., J. D. Reynolds 1, 27-15-15	¶41 and 228	4926
UNION COUNTY—		
Burharal Oil Corp., R. Pumphrey 1, 11-17-14	sw	3267
Marine Oil Co., Thompson A-9, 10-18-13	sw	3608

*Failures; †Junked; ¶Million cu. ft. gas.

SERVICE

Our service men will gladly discuss your mud and gas blow-out problems without cost or obligation.

OPALITE

A MUD STABILIZER

Opalite combines with rotary mud faster than any other admix. Will increase the weight of rotary mud from 8 to 16 pounds, if desired, without affecting the flow of the mud. Opalite has a high safety factor of weight, and places a minimum load on the pumps. It lubricates the bit, holds up the wall, and carries cuttings to the surface (wherein trap gases are quickly released).

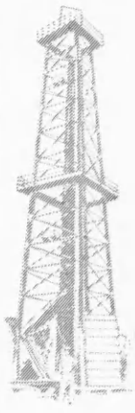
Opalite will increase drilling efficiency under all conditions.

CORONA PRODUCTS, INC.

Main Plant and Office — Rogers, Arkansas, U. S. A.

Stocks carried in all active fields:
TURNER LUMBER CO., Houston, Texas
COASTAL SUPPLY CO., Houston, Texas
WM. CAMERON & CO., Dayton or Liberty, Texas
J. F. ELLIS LUMBER CO., Vinton, Louisiana
Stocks in practically all other active fields.

Our service men will be glad to give any assistance possible.



"21 Years Reliable Service"

Rig Building and Construction Contractors

LUMBER - TIMBERS - STEEL DERRICKS
BOLTS - BUILDING SUPPLIES

Operating in Kansas, Louisiana, New Mexico, Oklahoma, Texas

THE FOX RIG AND LUMBER CO.
Rig Contractors and Building Supply Dealers
P. O. Drawer 991 General Office: 11 East Broadway Phone: 32 and L. D. 42
ARDMORE, OKLAHOMA

Fields Connected

GAP BETWEEN EUNICE AND MONUMENT PRODUCES OIL

Hobbs, N. M. — Territory between Eunice and Monument fields has two tests in process of completion as oil producers, indicating that the two areas will be joined together with an over-all length of about 15 miles in a north and south direction. Prior to drilling these two semi-wildcats the interval of untested territory was shortened to 4½ miles through gradual extension of developments in both areas. There are possibilities that lime porosity will be poor in a portion of the gap as the two connecting wells failed to respond to acid treatment with a steady flow of oil, although definitely classed as commercial producers.

Gulf Oil Corporation's Amos B. Reeves 1, C NW SW 29-20s-37e, 1½ miles northeast of nearest production in Eunice field, cored first oil saturation in lime at 3832 feet, and was cored to 3844 feet, or 315 feet below sea level. The hole swabbed dry on natural production test, and responded to treatment with 1000 gallons of acid by swabbing nine barrels of oil per hour. It has since been treated with 3000 gallons of acid solution. Base of salt was logged at 2400 feet, or 1129 feet above sea level. The Texas Company's State-Aggie 1, C SE SE 31-20s-37e, nearest producer, logged the base of salt at 1061 feet above sea level, and flowed 40 barrels hourly through tubing after using 3000 gallons of acid in lime at 3742-3862 feet. The latter is bottomed at 312 feet sub-sea.

Repollo Oil Company's Wm. C. Roach 1, NW NW NW 21-20s-37e, about two miles southeast of nearest production in the Monument field, was drilled to 3830 feet, or 315 feet sub-sea, and could not lower an oil column below 1500 feet on a swabbing test. It was treated with acid and flowed 110 barrels oil in five hours. The same company's Effie H. Bolding 1, NW NW NW 10-20s-37e, 2¼ miles due east of production on the south end of Monument field, failed to log oil saturation of any consequence in drilling to 4104 feet, or 553 feet below sea level. It will deepen to water, then plug back and try for gas production in the upper lime. Repollo Oil Company's J. H. Williams 2, SW SW SE 33-19s-37e, east outpost location, logged saturated lime at 3911-15 feet, with an elevation of 3568 feet, and swabbed 180 barrels daily. A previous test drilled in the northeast corner of the same section produces about 15 barrels oil and a high percentage of water daily. First oil pay was logged at 3913 feet, and the hole is bottomed at 4153 feet, or 566 feet below sea level.

Amerada Petroleum Corporation's J. R. Phillips 2, C SE NE 1-20s-36e, an inside location for the south portion of Monument field, was completed with natural flow of 28 barrels hourly through open tubing with packer set at 3860 feet. The well is bottomed at 3890 feet and on a preliminary gauge tested eight million feet of gas with spray oil on one-inch choke. The same company's State 2-H, C NW SE 1-20s-36e, likewise offered an excessive gas-oil ratio when unloaded for completion at 3879 feet, and has since been killed to install packer on tubing. Charles H. Weir 1-B, C SW NE 26-19s 36e, northwest outpost location, is knocking out bridge formed in casing after 400-quart nitro shot at 3840-4000 feet. When originally tested at the latter depth it produced gas with a spray of oil, and failed to encounter any appreciable oil saturation or water in deepening to 4030 feet or 355 sub sea, with cable tools. Amerada Petroleum Corporation will authorize three new locations next week.

Nine Locations

Nine new locations were staked in Lea County the past week, including three for Monument field. These included Skelly Oil Company's State 1-E, C SE NE 29-19s-37e; Repollo Oil Company's B. J. Barber 2, NW NE NE 7-20s-37e; and Continental Oil Company and The California Company's J. L. Reed 2-A-3, C SE NE 3-20s-36e. This partnership made location for Meyer 12-B-4, 5940 feet from south and 1980 feet from west lines of 4-21s-36e, Eunice field. The Texas Company's State-Aggies 2, C SW SE 31-20s-37e, was the only additional location for Eunice field. North Jal field gained one project when Byrd & Frost, Incorporated, authorized the drilling of E. J. Wells-Conoco 1-A, C NW SW 1-21s-36e. In the South Eunice sandy-lime belt, Skelly Oil Company made locations for Ellen Sims 1, C NW SE 3-23s-37e, and J. Baker 1, C NW NW 27-22s-37e. This company also made location for Stuart 1, C NE NW 15-25s-37e, offsetting production in the East Jal sandy-lime area.

Sun Oil Company's J. R. Stuart 1, C NW SE 15-25s-37e, south offset to a prolific, natural flowing well developed recently in the sandy-lime belt northeast of Jal by Culberson, Erwin & Stovall's Stuart-Repollo 1 from pay at 3280-3294 feet, missed the heavy production in drilling to 3380 feet, but yields about 40 barrels of oil daily by swabbing. It is about 30 feet lower on structure, and will be given a heavy shot of nitro. Other operations in this area did not report any appreciable change in status the past week. Liberty Oil & Drilling Company's John W. Hair-Repollo 1, SW SW SE 24-24s-37e, has fulfilled the contract in drilling to 3702 feet. No production was encountered. Owners desire to deepen, if satisfactory arrangements can be made with contributors of dry hole money, as the original deal specified dry hole money would not be paid in event of a producer.

The outlook for production from Sun Oil Company's W. W. Weatherly 1, C NE SW 17-21s-37e, wildcat in the sandy-lime belt to the north of the town of Eunice and 1½ miles northwest of a wildcat producer, was not promising after drilling to 3815 feet. The formation was treated with 4000 gallons of acid, but due to the lack of porosity did not absorb the fluid readily. A production test was in progress late last week. Salt series was logged at 1350-2486 feet, with an elevation of 3486 feet. The same company's A. D. Richards 1, C NE SE 6-23s-37e, west offset to production in the South Eunice sandy-lime belt, was scheduled to be shot at 3798 feet after showing a small quantity of oil and water on a swabbing test.

Pierce

***Universal* Governors**

***Meet Every Requirement*—Pierce Governor outfits, complete, are available for nearly all standard industrial engines, but the Pierce Universal Governor was developed especially for automotive engines that have been converted into stationary power plants. These governors can be used on any make or model of engine. They are suitable for governing any engines used for operating pumps, welding generators, lighting generators, air compressors, hoists, etc.**

CLOSE REGULATION—Pierce Universal Governors are belt driven and either flat or V-belts may be used. The governors are of the centrifugal (or flyball) type and respond instantly to each change in engine load, maintaining a uniform speed regardless of load variation.

Because of their efficiency, Pierce Governors have been regular equipment on a majority of the standard industrial engines and on various types of industrial machines. No better governors are obtainable. Write for literature and prices.

The Pierce Governor Co.

600 Ohio Avenue, Anderson, Ind.

BYRON EXTENSION
Another fault block opened by producer

ROCKY MOUNTAIN FIELDS

WEEKLY STAFF REPORT

Lovell, Wyo.—Proving another fault block for Big Horn County, northern Wyoming, Sidney H. Keoughan and Taylor Oil Company's extension test on Byron Dome, is also one of the largest wells completed to date for that area. Flowing 40 barrels oil hourly after treatment with acid the well, Hoskins 1, Lot 59, SE SE 25-56n-97w, drilled the saturated Tensleep sand from 5355-5371 feet. It was treated with 2000 gallons of acid in the Embar lime at 5254-5335 feet, and swabbed in at 40 barrels hourly. Oil rose to top of hole rapidly and started flowing 20 barrels per hour and increased to 40 barrels per hour. The 8¼-inch production casing is set at 5271 feet.

Preparations are going ahead by Keoughan and Taylor Oil Company to drill another Byron well on the Robinson lease but exact location has not been announced.

South Central Wyoming

Another Sundance producer for the Rock River field, Carbon County, south central Wyoming, was brought in this week as another nears completion. Ohio Oil Company's Harrison-Cooper 8, SW SW 35-20n-78w, pumped 354 barrels initial with production developed in the Sundance sand at 3320-74 feet. Alvy Dixon 1, NEc SE 34-20n-78w, in the same field, is swabbing in with hole bottomed at 3314 feet. The 4¾-inch production string is set at 3255 feet.

Finding water in the first Sundance and the basal Sundance sands missing Ohio Oil Company's Harrison-Cooper 9, SWc 35-20n-78w, is cemented back to the Lakota at 3175 feet where it will recomplete. It was drilled to 3800 feet in the red beds. Diamond Cattle Company 7, N 35-20n-78w, Rock River, has rig up and waiting on rotary from Dixon 1. This well is being drilled from the surface to the Sundance formation and is not a deepening operation.

On Big Medicine Bow Dome, Carbon County, Ohio Oil Company joint with The California Company is drilling at 3905 feet in Union Pacific California 2, CNE NE 35-21n-79w, and Union Pacific 3, CNE SE 23-21n-79w, is drilling at 2852 feet.

Eastern Wyoming

An important east extension test to the Sundance production in the Lance Creek field, Niobrara County, eastern Wyoming, was released this week by Continental Oil Company as other extension tests get underway.

Continental Oil Company's Apex 5, SE NW 34-36n-65w, is moving rotary from Argo Elliott 7. Agnes Rohlff 6, CSW SW 32-36n-65w, is coring in the Sundance at 3400 feet, Jose 4, CSW NE 6-35n-65w, is drilling at 2468 feet.

Argo Oil Company's Elliott 7, CNE SW 5-36n-65w, south extension test to the Sundance pool, Lance Creek, is swabbing in and testing production. Total depth is at 4009 feet in the red

The New Chiksan Aluminum Dock Hose, Joints and Risers are on display at booths 25 and 26 in the Refiners and Marketers' building at the Tulsa Show.

See this new light weight, non sparking hose and get complete information on all the Chiksan Products pictured here.

Chiksan

CHIKSAN OIL TOOL CO. LIMITED

FULLERTON, CALIFORNIA — GULF ENGINEERS INC., HOUSTON, TEXAS

NO LOST MOTION in NUT TURNING

with the **FAVORITE** Reversible Ratchet **WRENCH**

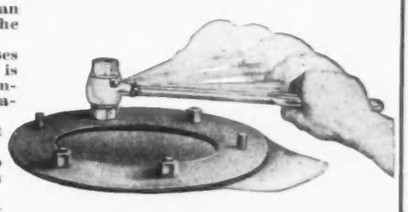
Many operations require the quick turning of nuts. This can be efficiently done with the "FAVORITE."

The wrench head encompasses the nut on all sides, so there is no danger of slipping, and damage to nut or injury to operator is avoided.

Opening in head allows bolt to pass clear through.

Each wrench can turn two different-sized nuts — one on each side of head.

Reverse motion instantaneous by turning pawl.



SEND FOR FULL PARTICULARS

GREENE, TWEED & CO.

Sole Manufacturers

109 DUANE STREET NEW YORK

beds and the Sundance was logged at 3941-97 feet.

Northeast extension well to the Sundance pool, Lance Creek, Ohio Oil Company's Agnes Rohlff 3, SW SE NE 32-35n-65w, is running packer on 2½-inch tubing to complete. Hole bottoms at 3958 feet in the top of the red beds. The lower Sundance was topped at 3871 feet.

MacKinnie Oil & Drilling Company is building rig for Mary Thompson 1, NEc NW NE 7-35N-65W, a south extension test to the Sundance.

West outpost well of the Lance Creek field of the J. M. Huber Corporation is pumping 194 barrels oil and like amount of water daily. The well, Joss 1, SW NE 6-35n-65w, is plugged back from 4096 feet to 4032 feet. The company is waiting on casing tester to find if source of water is from casing leak. If it is not the company will drive plug and recement for water shut off.

MONTANA

Kevin, Mont.—Northern extension of the Sunburst sand pool of the Kevin-Sunburst field, Toole County, is believed likely this week with the drilling of Welsh Brothers' DeWald 1, SW NE NE 26-36n-2w, in the Sunburst horizon. This well is a mile and three quarters north and three quarters of a mile east of the Sunburst discovery well in an area of 5000 acres which heretofore had been untested.

DeWald 1 shows all the characteristics in its log of other Sunburst producers. Operators are at present setting the pipe at 1533 feet.

An oil well, a dry hole and a new location were reported for the field this week. Imperial Craig's Martin 3, NW NE 18-35n-1w, after acid treatment is making 55 barrels daily in settled production with total depth at 1618 feet.

In the west end of the field Eddy-Engleking's Sohn 1, SW NE 26-35n-3w, was a dry hole. Water developed at 1648 feet. Although the well had 8 feet of pay from 1612 to 1620 feet it showed for no oil.

Nepstad Vanderpas is moving in material for Solberg 1, NE NW SE 20-35n-3w.

Cut Bank Field

One good well was brought in in the south side of the Cut Bank field, Glacier County, northern Montana, this week, where operators are using nitroglycerine to good advantage in boosting production. There were three new locations released this week as several wells are nearing completion. Marshall & Manning's Tr. 120, 1, Lot 7, 7-32n-3w, is estimated to make a 100-barrel producer. Oil rose 2300 feet in the hole and total depth is at 2969 feet. The Texas Company's Morrison 6, 660 feet south of the NWc of 22-35n-6w, is rigging up.

Santa Rita Oil & Gas Company released location for McCabe Permit 2, SE NW SW, in the Big Bend pool of the field.

H. R. Patterson spotted a well in CNE NE 1-33n-6w, where materials are now being moved in.

EASY TO INSTALL

GRIZZLY DRILL PIPE PROTECTORS

The patented hinged construction makes it simple and easy to place on the pipe. No special tools of any kind required.

When in position on pipe simply drive the tapered locking key through the tapered slots with a light hammer

To remove, tap the tapered locking key upward through tapered slots until loose, and pull out.

Just as EASY TO TAKE OFF

The PROTECTOR that PROTECTS

They're easy to install and easy to take off, BUT—once locked on the pipe they stay put and will withstand any blow or strain encountered in service without slipping, piling-up, or overlapping. Cannot snap off or tear off

E. M. SMITH COMPANY
600-650 South Clarence St., Los Angeles, California

Sold in the Mid-Continent and Gulf Coast by: Continental Supply Co. T. T. Word Supply Co., Inc., Houston, Texas — In All Their Stores and Independent Pipe & Supply Co., 2311 West Street, Houston, Texas. Export Office: Continental Emsco Co., 30 Rockefeller Plaza, New York City.

MOUNTAIN STATES Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
NEW MEXICO		
LEA COUNTY, (Eunice Field)—		
Gulf Oil Corp., Orcutt 1-B, C lot 7, 5-21s-36e	300	3865
Orcutt 2-B, c lot 8, 5-21s-36e	500	3864
Humble, A. J. Adkins 3, c ne sw 10-21s-36e	700	3880
Repollo Oil Co., E. C. Adkins 7, sw ne se 9-21s-36e	2000	3890
Shell, State-Endura 1-D, c se nw 11-21s-35e	*	4212
LEA COUNTY, (South Eunice)—		
Skelly Oil Co., B. L. King 1, c sw se 32-22s-37e	54	3680
LEA COUNTY, (Monument Field)—		
Amerada, J. R. Phillips 2, c se ne 1-20s-36e	700	3890
Shell, State 2-D, c ne se 19-19s-37e	3600	4002
Skelly Oil Co., B. A. Christmas 1, c sw sw 25-19s-36e	100	3942
The Texas Co., J. R. Phillips 2, ne ne nw 6-20s-37e	4000	3890
LEA COUNTY, (Wildcat)—		
W. L. Todd, Inc. et al, Lemon 1, c nw sw 17-21s-32e	*	3752
MONTANA		
GLACIER COUNTY, (Cut Bank Field)—		
Texas Co., Tribal 1 B, sw nw 32-33n-5w	100	2778
Par Oil Co., Haines 6, ne se sw 2-34n-6w	45	....
Lon Crumley sw se 31-33n-5w	50	2851
TOOLE COUNTY, (Kevin-Sunburst Field)—		
Coolidge & Coolidge, State 1, nw nw 36-36n-2w	85	1531
Crumley, Shaw 8, se nw se 35-36-2w	50	1565
Imperial Craig Co., Martin 3, sw se 18-35n-1w	39	1618

*Failures; †Junked; ¶Million cu. ft. gas.

El Segundo Well

VENICE EXTENSION TEST SHOWS HEAVY PRESSURE

WEEKLY STAFF REPORT

Los Angeles.—Eastern Oil Company's D.R.L. & W. No. 1, Section 22-2s-15w, eastern extension test of the Venice field in Los Angeles County, has been drilled to 7339 feet and 9⅝-inch casing has been cemented at 835 feet. Trouble is being encountered in cleaning out to bottom, due to heavy gas pressure. Weight material is being added to the circulating mud in an effort to correct this difficulty. Operator will cement 7-inch casing in preparation to completing.

The El Segundo district received additional support in proving itself a factor as an oil producing area in Los Angeles County. Republic Petroleum Company's El Segundo 2, Section 18-3s-14w, total depth 7477 feet with 7-inch casing cemented at 7355 feet, was completed for 500 barrels a day of 26.2 gravity oil, cutting 9.2 percent. Forty pounds were registered on the tubing and production was flowing through 4-1/64-inch bean. The well was killed and 174 feet of 5¾-inch liner, including 74 feet of perforated, has been landed at 7477 feet and is cemented through perforations at 7403 feet. This blanks off the Nodular shale above the conglomerate which was topped at 7407 feet.

Ohio Oil Company has made a tentative location for Gough 1, Section 7-3s-14w.

In the East Montebello field, Los Angeles County, Universal Oil Consolidated's Farmer 1 was brought back to production for 715 barrels a day of oil and 210 barrels of water. The hole was cleaned out to 5880 feet and perforations shot with 120 holes from 5877 to 5735 feet.

Womac Incorporated's No. 1, Section 4-2s-11w, East Montebello field, was completed for 150 barrels a day of 29.0 gravity oil. Total depth is 3121 feet with 8⅝-inch casing cemented at 2952 feet.

The Redondo coastal field was productive of one completion during the past week. George K. Linderman Oil Corporation completed its first well for 300 barrels a day of 17.0 gravity oil. Total depth is 3746 feet with 8⅝-inch casing cemented at 3213 feet. This project offsets the Dumas-Lewis Oil Company's discovery well which is now pumping 300 barrels a day of 18.2 gravity oil.

Interest is turning to the Wilmington district, Los Angeles County, where Sovereign Oil Corporation has completed Banning 1, Section 28-4s-13w, for 100 barrels a day of 15.0 gravity oil, cutting 30.0 percent fresh water and mud. Total depth is 3663 feet with 10¾-inch casing cemented at 3272 feet. North of this location, Codri Oil Company's No. 1, Section 29-4s-13w, was placed on the pump for an estimated daily rate of 50 barrels, 14.5 gravity, cutting 20.0 percent. Acreage in this area for the past six months has been slowly acquired by several large independents which will undoubtedly lead to drilling activity this summer. James Hull, has material on the ground for his initial test of this area, approximately 900 feet south and 1500 feet east from the center of Avalon and Willow streets, Section 20-4s-13w.

Shell Oil Company has abandoned McKenna 1, important wildcat test, north of the Torrance field in Section 33-3s-14w, after being drilled to 7352 feet in schist. Top of the schist was encountered at 7235 feet and found to be barren. Upper oil showings from 4390 to 4100 feet were tested but found to be wet. The company still retains its holdings and a new project probably will be drilled.

In the Athens-Rosecrans field, Re-

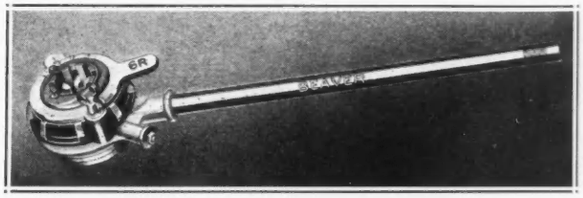
CALIFORNIA
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
BELRIDGE—		
Belridge Oil Co. Well 6-1	3500	8430
FRUITVALE—		
Dixie Lee Oil Co. Well 3	135	3205
Luther Mayo, Mayo 1	5	4140
Mohawk Oil Co., Osborn 1	135	3780
KERN FRONT—		
C. C. M., No. 60	185	2240
MIDWAY SUNSET—		
Chief Oil Co., Francis 1-A	260	2654
Standard, M J & M M 24	164	2724
Well 33 D-54	452	3138
MOUNTAIN VIEW—		
Hogan Pet Co. Foster Comm. 3	1200	6049
Ohio, Derby 4	1644	5860
PREMIER—		
Standard, Well 9-1	180	2850
ROUND MOUNTAIN—		
Shell	407	1548
KETTLEMAN HILLS—		
K. N. D. A., No. 72-30J	3495	8497
ELWOOD—		
Signal O. & G. Co., Permit 98-7	680	3757
REDONDO—		
Linderman Oil Corp. Well 1	150	3747
EL SEGUNDO—		
Republic Pet Co. Rep. El Seg. 2	350	7477
DOMINGUEZ—		
Union, Callender 45	425	6902
MONTEBELLO—		
Standard, Baldwin 83	101	3900
Baldwin 84	225	3050
Texas, Baldwin 13	359	7310
Womac Inc, Womac 1	60	3200

*Failures; †Junked; ¶Million cu. ft. gas.

The Only "One-Piece" Ratchet

Threading ¼ to ¾-inch.



No. 6-R Beaverette Ratchet—Fully Self-contained—Fully Adjustable

It's "all there when you want it"—no loose parts to hunt for or change.

Ideal for use in ditches, corners, or close to wall.

It threads ¼, ⅜, ½ and ¾ without changing dies or bushings. It's instantly adjusted for cutting standard, oversize or undersize threads. A universal pipe guide centers the pipe accurately and quickly. Close nipples can be cut. The two sets of dies required to cover the two different thread pitches are always in the tool. Use it for iron, steel, brass or copper pipe. Right or left hand. Size for ⅛-inch extra if desired.

It is also made in the plain model—non-ratchet.

Net Prices—

No. 6-R Beaverette Ratchet, ¼ to ¾" $13.50

No. 6 Beaverette Plain, ¼ to ¾" 12.00

Buy it through your jobber.

Write for Complete Catalog. The Quality Line Since 1900.

BEAVER PIPE TOOLS

500 WEEKS AVENUE WARREN, OHIO

public Petroleum Company is pouring foundation for Trust 1, located at the intersection of Rosecrans and Figueroa streets. This is to be a deep test.

West American Oil Company's Del Amo 1, Section 3-4s-13w, wildcat test east of the Dominguez field, Los Angeles County, total depth 8350 feet is in oil sand and shale. Top of this zone was cored at 8310 feet. Hole is now being reamed to set a conductor string of casing at 6200 feet before further deepening. This venture is located between the Los Cerritos extension of the Signal Hill field and the Dominguez field. A successful completion at this location would be of major importance. A combination of acreage and town lots would be involved in any drilling program attempted.

Yant Petroleum Corporation's wildcat test, Section 1-3n-16w, in the Newhall District, total depth 2024 feet with 8⅝-inch casing cemented at 1680 feet, was swabbed for production and showed mostly water. An instrument is now being run to locate the source of the water. Newhall is the cradle of the California oil industry but prospecting in this vicinity is still common after a half century of activity.

Kern County

North of the Lost Hills field, in Kern County, the Associated Oil Company is pouring foundations for Williamson 2, Section 2-26s-20e. The company's Williamson 1, Section 2-26s-20e, was abandoned last year. In the same section, Standard Oil Company is drilling United 1 at 6335 feet after the well came in out of control, flowing salt water.

Northwest of Coalinga in Fresno County, Seaboard Oil Corporation's Welsh 1, Section 10-16n-13e, has been abandoned at 4455 feet in brown shale and gray sand (Oligocene).

Holly Development Company's Padden 1, wildcat gas test in Section 16-2s-5e, San Joaquin County is coring at 5000 feet in shale and gray sand. As the well has shown nothing of encouragement, operators plan taking one more core and abandon.

Leases in Section 30-21s-16e and Sections 14- and 24-21s-15e, Fresno County, have been acquired by Hogan Petroleum Company. This company has been active in the development of the southeast end of the Mountain View field. The property leased is in the Jacalitos area, 5 miles south of Coalinga.

Seaboard Oil Corporation is to drill a test well on the Ciervo anticline, in the southeastern part of San Benito County. This would test the possibilities of gas production in the Cretaceous section. Union Oil Company is also heavily interested in this district.

Buffalo Oil Company's Wildman 1, Section 24-30s-29e, semi-wildcat project in Kern County, has been drilled to 1180 feet in granite. Top of the basement was cored at 1174 feet. Twenty feet of oil sand was cored from 759 to 779 feet and 11¾-inch casing is cemented at 755 feet.

E. H. Moore, an Oklahoma operator, is pouring foundation for Union-Sugar 1, over abandoned Shell Oil Company's core hole A-1, SW 25-10n-35w. This core hole was drilled to 3035 feet. Approximately 4000 acres have been acquired by the operator for the purpose of further testing this area.

Belridge Oil Company's 6-1, Section 1-28s-20e, was completed flowing 1851 barrels a day of 42.6 gravity oil, cutting 3.9 percent. Tubing pressure is 2400 pounds, casing pressure 2750 pounds, through 52/64-inch bean with 46,410,000 cubic feet of gas. On a 2-hour and 20-minute potential test the well flowed at a 3670 barrel per day rate, 42.5 gravity, 3.9 cut, with 850 pounds tubing pressure, 1600 pounds casing pressure, through 2 96/64-inch beans. This well was drilled to the Lower Wagon Wheel zone with bottom at 8435 feet and 7-inch casing cemented at 8090 feet.

In the Kern Front district of Kern County, Elbee Petroleum's outside test, Section 13-28s-27e, was drilled to 2086 feet in gray sand and is being abandoned. Top of the Kern River Series was cored at 1800 feet.

Petrol Producing Corporation has acquired 2½ acres of the Foster Community property originally held for the purpose of drilling water wells and is pouring foundation for a test located approximately 1030 feet north and 165 feet west from SEc 32-30s-29e. This is the smallest lease ever obtained in the Mountain View field.

The southeast end of the Fruitvale field, Kern County, is to receive another test with the drilling of Nydia Petroleum Company's Ticehurst 1. Foundation is being poured 990 feet south and 810 feet east from NWc 26-29s-27e.

In Kings County, Royalty Service Corporation quitclaimed Spreckles 1 back to John Hurndall and associates. Further tests will be conducted by the present owners. The hole has been bridged from 2100 to 1981 feet.

Kettleman North Dome Association's 72-30J, Kettleman Hills field, was completed flowing 3495 barrels a day of 34.2 gravity oil, with 4,611,000 cubic feet of gas. It was drilled to 8479 feet with 6⅝-inch casing cemented at 8244 feet.

South of Maricopa, in the vicinity of the Pioneer anticline, approximately 1000 acres have been turned to a major company for the purpose of drilling a test well. The old General Petroleum Corporation's Bell-Wrightsman well was drilled in this area and was productive of about 10 barrels of oil per day for a short time.

Leases are being acquired by major interests in and around the South Dome area of Buttonwillow. South of this district Ohio Oil Company is coring K.C.L., D-1, Section 1-30s-25e, at 7519 feet and Shell Oil Company's K.C.L. 1, Section 29-30s-26e, has been drilled to 7888 feet in oil sand and is reaming at 7348 feet preparatory to cementing casing.

C. J. Gibson's Hart & Dearin 3, Section 6-11n-23w, has been drilled to 3315 feet in gray sand and is to be abandoned. The company's O'Brian 3, Section 6-11n-13w is drilling at 1000 feet.

Shell Oil Company's Dorsey-Flack 1, Section 7-11n-23w, is bottomed at 2794 feet. Hole was reamed to 2670 feet and formation tester was run with packer set at 2670 feet. The test proved unsuccessful due to the packer leaking and hole is being reconditioned for a second formation test.

Opposite the Subway Terminal
LOS ANGELES

The Most convenient
The Best accommodations
The Finest meals

From $2.50 PER DAY

Grill
Tavern
Coffee Shop

Easy chairs, sleep-inspiring beds, large rooms with luxurious fittings

Unsurpassed service and luxury are yours at amazingly low cost

New HOTEL CLARK
P.G.B. MORRISS Mgr.

SCANDINAVIA
BELTING

DRILLING . . PUMPING . . CONVEYING . . ELEVATING . . & OTHER APPLICATIONS IN OILFIELDS & REFINERIES . . ENDLESS WOVEN BELTS FOR CENTRIFUGES

Highest Quality
Longest Service
—
Manufacturers

SCANDINAVIA BELTING COMPANY
248 Central Avenue, Newark, N. J. Factory, Charlotte, N. C.

LARGE PRODUCER
In Yost-Jasper field is completed by Pure Oil

WEEKLY STAFF REPORT

Mt. Pleasant, Mich.—Nineteen completions in Michigan for the week included a 1250-barrel well producing through 6-inch casing from the Traverse lime formation on Pure Oil Company's Bond Root 7, 13n-2w-3, Midland County, record initial flow for Michigan completions in several weeks. Bond Root 7 is located in the proven Yost-Jasper area controlled almost entirely by Pure Oil Company.

The field has been under development for nearly three years with most wells completed in the Dundee at about 3440 feet. The Traverse has produced irregularly. The Bond Root 7 was bottomed at 2935.

Five of the failures were wildcats, including the Rowmor Oil Corporation's Tow 1, 10n-6w-36, Montcalm County, a major setback to prospects in the Vickeryville district. Tow 1 is located 1¾ miles north of the Jetter-Long discovery Dundee well at Vickeryville (25-barrel initial). It marked the second failure in an attempt to establish a pool of commercial importance.

Another setback also appeared likely with Mammoth Petroleum Corporation's Mellinger 1, 18n-2w-35, Gladwin County, picking up water 73 feet in Dundee lime with top at 3898 feet. Operators probably will abondon. Mellinger 1 is the first completion of three tests started in an attempt to push the extent of the Beaverton pool farther north. It was located a mile northeast of production.

MICHIGAN
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
GLADWIN COUNTY—		
Triangle Oil Co., Iosco Land 1, 17n-2w, se sw se-2	40	3893
MECOSTA COUNTY—		
G. M. Obenauer, Bernwald 1, wo, 13n-8w-26	*	3600
MIDLAND COUNTY—		
Ward J. Blunt, Harrison 1, 14n-2w, nw nw sw-18	10	3580
J. V. Wicklund, Rhoer 1, 16n-1w, sw sw nw-7	*	4050
Pure Oil Co., Bond Root 6, 13n-2w, n½ ne se-3	220	3440
Bond Root 7, 13n-2w, n½ sw ne-3	1230	2935
Flynn & Larsen, Green 1, 13n-2w, nw se ne-13	50	3450
MONTCALM COUNTY—		
Stewart & Atha, Morgan 1, 12n-9w, c sw se-9	*	1450
Wiser Oil Co., Jayne 1, 12n-7w, ne se-9	¶23	1296
J. W. Leonard, Jr., West 5, 10n-5w, se se nw-11	25	3198
Rowmor Oil Corp., Honderich 1, 10n-5w, sw nw nw-1	¶26	989
Tow 1, 10n-6w, nw nw ne-36	*	3205
McClanahan Oil Co., Lamphier 2, 10n-5w, se sw ne-2	50	3199
Daily Crude Oil Co., Flint 3, 11n-5w, ne sw se-34	30	3211
OGEMAW COUNTY—		
Webber Oil Co., Wilcox 2, wo, 22n-2e-34	145	2676
Ogemaw Oil Co., Baumchen 1, 22n-2e, nw nw sw-27	30	1765
McClanahan Oil Co., Heintz 2, 22n-1e, nw ne ne-24	25	2788
T. F. Caldwell, Hart 2, ne sw ne-19.	75	2721
SAGINAW COUNTY—		
Mid State Dev., Burlson 1, 10n-5e, se sw se-21	*	2858

*Failures; †Junked; ¶Million cu. ft. gas.

Mt. Pleasant, Mich.—Michigan continued in the million-barrel column for crude oil production last month, but declined from 1,115,257 barrels in March to 1,025,852 barrels for April. The daily average for the two months was down from 35,977 barrels to 34,195 barrels.

EASTERN FIELDS
Completions

WEEKLY STAFF REPORT

OHIO

Company, Well and Location	Init. Prod. Bbls.	Depth
ASHLAND COUNTY—		
Ohio FG Co., Talbot 1	26	2633
HOLMES COUNTY—		
Ohio FG Co., Mizer 1	¶	4032
SUMMITT COUNTY—		
E Ohio Gas Co., Lamb 1	¶	4029
HOCKING COUNTY—		
Murray City Oil & Gas, Acker 11	3	....
PERRY COUNTY—		
Caywood Mid-East Gas Co., Caywood 2	*	....
Hopewell Gas & Fuel Co., J. Lonas 1	¶	2831
Kachelmacher, Hemlock 13	24	....
Mid-East Gas Co., Melick 1	*	3180
WASHINGTON COUNTY—		
Wickens & Adkins, Wickens & Adkins 21	6	1012
Schneider Oil & Gas, Abicht 5	¶	1515
STARK COUNTY—		
Ohio Fuel Gas Co., Harimont 4	¶	4382
Ohio Fuel Gas Co., Buchtell 1	¶	4280
East Ohio Gas Co., Smith 1	¶	4382
MEIGS COUNTY—		
Ohio Fuel Gas Co., Barton 1	¶	711
Mays Dev. Co., Gundee 2	*	731
Lafe McKnight Co., Grass 1	¶	831
MEDINA COUNTY—		
Oko Oil & Gas Co., Sandford & Watson 44	2	397
MUSKINGUM COUNTY—		
H. P. Muhlback & Co., Havey 1	20	3021
ATHENS COUNTY—		
Ohio Fuel Gas Co., Kinney 2	¶	1825
GUERNSEY COUNTY—		
Cambridge Glass Co., Gregg 1	¶	....
LICKING COUNTY—		
Everret Co., Nethers 1	95	2995
The Pure Oil Co., Loyghsen 7	64	3139
JACKSON COUNTY—		
Ohio FG Co., Eggler 1	*	2824
SANDUSKY COUNTY—		
W. G. Montgomery & Co., Hetrick 2	1	....
OTTAWA COUNTY—		
Neal Temple & Co., Ellithorpe 1	25	....
PIKE COUNTY—		
Dover Oil & Gas Co., McGuire 1	¶	375
VINTON COUNTY—		
Co-Operative Oil Co., Fee 4	4	....

KENTUCKY

Company, Well and Location	Init. Prod. Bbls.	Depth
OHIO COUNTY—		
Cumberland Pet. Co., Richards 21	7	....
Dr. Denton, Denton 1	¶	....
J. C. Miller & Co., Webster 2	15	....
B. E. Clavert & Co., Baise 3	¶	....
Ellis & Co., Evans 3	*	....
Osborne & Co., Sexton 1	*	....
Stewart & Gealey, Roberts 28	*	....

WEST VIRGINIA

Company, Well and Location	Init. Prod. Bbls.	Depth
CABELL COUNTY—		
W. Va. Gas Co., Savage 1	¶	3215
H. C. Zogg, Dunn 1	¶	....
RALIEGH COUNTY—		
L. Cabott, Inc., Beaver 10	¶	....
RITCHIE COUNTY—		
H. N. Reinhart, Reinhart 8	1	1982
KANAWHA COUNTY—		
Columbia Carbon Co., Copenhaver 4	¶	4843
RITCHIE COUNTY—		
F. E. Pritchard, Bradford 1	1	2175
R. C. Jackson & Co., Lanahan 2	2	2039
WESTZEL COUNTY—		
Null & Moorehead, Church 1	¶	....
ROANE COUNTY—		
L. C. Young & Co., Kees 1	¶	1730

*Failures; †Junked; ¶Million cu. ft. gas.

Announcing

2 New "United" Supply Stores

We take pleasure in announcing the establishment of two new United Supply Stores—at Oklahoma City and Hutchinson, Kansas—to serve the needs of the oil and gas industry in the drilling, completion and operation of wells.

These stores will not only carry a complete line of supplies, and equipment, but will be manned by a trained staff of widely experienced men, equipped to render intelligent service, engineering advice and prompt delivery.

UNITED SUPPLY & MFG. COMPANY

729 Kennedy Building **Phone 4-5154-5**

TULSA, OKLAHOMA

H. B. GUTELIUS **C. J. HALLORAN** **F. P. THIEMAN**

THE OIL WEEKLY REPORT ON IMPORTANT

Wildcat Tests

ALABAMA

HOUSTON COUNTY—Rice O&G Co.'s Oakley Est 2, nw sw 9-3n-29e, dr sand & shale 3437 ft.

ARKANSAS

BRADLEY COUNTY—Phillips Pet. Co.'s Murphy Land Co. 1, nw nw 12-11-11, rur.

CALHOUN COUNTY — Ben Barnett, Tr's Freeman Smith 1, se nw sw 36-15-14, dr 2631 ft.

COLUMBIA COUNTY—J. C. Buckbee, Tr's J. B. Wilson 1, sw ne 17-17-18, 12-in csg 300 ft dr 910 ft.

CRAWFORD COUNTY—Trumbo et al's Craddock 1, c nw ne 3-11-30, top Miss. lime 965 ft woc 8¼-in csg 1582 ft.

HEMPSTEAD COUNTY — Easton & May's Conway 1, ne sw 20-12s-27w, elev 290 ft, top Saratoga chalk 60 ft 10-in csg 80 ft base hd chalk 530 ft base chalk & shale 724 ft dr 1127 ft sandy lime.

LA FAYETTE COUNTY—Erwin & Leach's (Ohio Oil Co.), Bodcaw Lbr. Co. 3, nw nw 20-16-23, elev 250 ft stringer anhydrite 7176-80 ft (base Travis Peak), arr run tester in bro formation 7523 ft. Joe Modisett et al's Frost Lbr. Co. 1, 29-19-24, elev 261 ft 7-in csg 5310 ft cored sw sand 5539-54 ft coring 5803 ft.

LONOKE COUNTY—Frank F. Silver's Jos. Chambers Est. 1, sw ne nw 17-2-7, rur.

OUACHITA COUNTY — Carnes & Harrell's Robertson 1, nw se 7-12-19, spd woc 12½-in csg 180 ft. O. F. Whittaker's Howard 1, nw ne 20-12-16, woc 10-in csg 102 ft. Lion O. R. Co.'s Reynolds-Berg 1, se ne 28-15-15, lcn. Phillips Pet. Co.'s Mary Murphy 1, ne ne 28-15-15, lcn. Mary Murphy 2, ne ne 28-15-15, lcn. J. T. Arnold 1, w½ ne 27-15-15, rur. Berg 1, ne se 28-15-15, rur. Gette 1, n½ se 28-15-15, lcn.

UNION COUNTY—J. C. Buckbee, Tr's Ezzell 2, ne nw 13-17-15, dr 3375 ft. Mrs. Mamie McCurry et al's Slaughter 1, se se 9-17-16, sd 3106 ft. Root Pet Co.'s White 1, se sw 36-17-15, elev 257 ft pb to 2228 ft old td 3472 ft.

CALIFORNIA

FRESNO COUNTY

COALINGA—Jas. M. Conlon Co.'s No. 1, 30-19-15, td 889 ft; prep. to test.

MONOCLINE RIDGE—Seaboard Oil Corp.'s Welsh 1, 10-16-13, td 4465 ft; running formation tester.

CURRY MOUNTAIN — Standard's So. Coalinga 1, 36-21-14, dr 1480 ft, sand and shale.

CANTUA CREEK—Gulf's S. P. Land 3, 3-17-15, hard sand and shale, td 5365 ft.

KERN COUNTY

SO. MARICOPA—American Pacific Oil Co.'s No. 1, 18-10-23, rig. E. A. Bender's No. 1, 14-10-23, td 458 ft, wocs.

McKITTRICK—Balmac Dr. Co.'s Douglass 1, 22-29-21, sd 4800 ft.

DEVIL'S DEN—Cumberland Oil Co.'s Mabry 2, 17-26-18, td 4729 ft, sd. Richfield's Alferitz 2, td 2834 ft, hard shale, drlg.

McVAN—Framac Oil Co.'s Brown 2, 22-27-27, td 1413 ft, cleaning out.

POSO CREEK—Bargol Oil Co.'s Bargol 1, 11-27-27, shale, td 1255 ft, drlg. Miley Unger's Unger 1, 27-26-28, td 1432 ft, drilled out, tested.

SO. BUTTONWILLOW—General's Doyle McKeon 1, 5-30-24, td 6149 ft; perf. 4995-4975, testing.

NO. MOUNT POSO—H. Mann's No. 2, 27-26-28, td 1537 ft, co.

MOUNTAIN VIEW—Mohawk Oil Co.'s Earl Fruit 1, 10-31-29, prep to spud.

BUENA VISTA LAKE—Ohio Well A-6, 32-31-26, td 4676 ft, testing wocs. Well A-7, 5-32-26, grading location.

STRAND—Ohio's D-1, 1-30-25, td 7379 ft, sand and shale, drlg.

GRAPE VINE—Ohio's Title Ins. 1, 36-11-19, prep to spud. Reserve Oil & Gas Co.'s No. 1, 33-11-19, td 6030 ft, swabbing, little oil and gas.

ABBREVIATIONS

The following abbreviations, signs, etc., are used in completions and wildcat reports in THE OIL WEEKLY.

*—*dry hole abandoned well.*	owdd—*old well drilling deeper.*
‡—*salt water (completions).*	owpb—*old well plugging back.*
†—*junked and abandoned.*	pb—*plugged back or plugging back.*
¶—*million 'eet o' gas.*	r—*reaming.*
abd—*abandoned.*	rog—*rig on the ground.*
bbls—*barrels.*	rur—*rigging up rotary tools.*
br—*building rig.*	rust—*rigging up standard tools.*
b.s.—*basic sediment.*	sd—*shut down.*
csg—*casing.*	sdtr—*sidetracking.*
co—*cleaning out.*	sg—*show gas.*
dd—*drilling deeper.*	si—*shut in.*
dk—*derrick.*	so—*show oil.*
dr—*drilling.*	so g—*show oil and gas.*
fsg.—*fishing.*	spd—*spudding.*
ft—*'eet.*	sr—*straight reaming.*
hfw—*hole 'ull o' water.*	sw—*salt water.*
in—*inches.*	td—*total depth.*
lcn—*location.*	ur—*underreaming.*
m—*milling.*	wih—*water the hole.*
mim—*moving in materials.*	wo—*workover.*
mit—*moving in tools.*	wocs—*waiting on cement to set.*
mot—*milling on tools.*	wost—*waiting on standard rig.*
n, s, e, w—*north, south, east, west.*	
oih—*oil in hole.*	

KERN FRONT—Amer. Exploration Co. Exp. 1, 16-28-27, siltstone, td 1600 ft, drlg.

EDISON—R & R Devel. Co. Well R.R. 2, 32-30-30, hd gr sand, td 704 ft, drl.

MOUNT POSO—Poso Pet. Co.'s No. 1, 2-27-27, sd 1427 ft.

ROUND MOUNTAIN—Piute Holding Co.'s Piute 1, 17-28-29, lcn.

NO. MOUNT POSO—Santa Carla Oil Co.'s Glide 1, 7-26-28, dr 2008 ft.

STEVENS AREA—Shell's K.C.L. 1, 29-30-26, r. to set cs, td 7888 ft.

COMANCHE POINT — Signal Oil & Gas Co.'s Tejon 1, 30-32-30, rig. Tejon Ridge Oil Co.'s No. 1, 23-32-29, dr 2383 ft, silty shale.

WHEELER RIDGE—Silver Gate Co.'s Tejon 1, 7-10-19, sd 2985 ft.

LOST HILLS—Standard's United 1, 2-26-20, td 6335, flowed hot salt water. Prep. to deepen.

BUENA VISTA—Superior's B.V.A. 1, 6-32-25, sd 4880 ft.

POSO CREEK — Milton J. Unger's No. 1, 27-26-28, dr gray sand 1350 ft.

McFARLAND—Woods & Bailey's No. 1, 16-26-26, td 3450 dr, co.

HUMBOLDT COUNTY

EUREKA—Texas's Eureka 2, 22-3-1, td 4357 ft, fsh drill pipe, top 1588 ft.

KINGS COUNTY

PYRAMID HILLS—Associated's Avenal 1, 35-23-17, foundation. J. P. Herndall & Assoc. (Was Royalty Service Corp.'s No. 1) 16-24-18, sd 4201 ft. Will let stand.

DOS PALOS—Pure Oil Co.'s Chowchilla 3, 17-10-14, foundation.

SAN JOAQUIN COUNTY

STOCKTON—Holly Dev. Co.'s Padden 1, 16-2-5, dr 3165 ft, sand and gravel. Standard's McDonald 1, 25-2-4, td 4614 ft, ran formation tester, blew gas, 9000 MCF rate.

SAN LUIS OBISPO COUNTY

CARRIZO PLAINS—Barnsdall Oil Co.'s Wreden 1, 24-28-17, dr sand and shale, 3252 ft. J. C. Theriot, Holland 1, 22-32-22, abn.

ARROYO GRANDE — Prismo Pet. Co.'s Scott 2, 5-32-13, grade. Birch-Royer Oil Co.'s Patchell 1, 33-31-13, td 1629 ft, drlg. corr. depth. J. D. Martin's No. A-4, dr, 2200 ft, C-L, dr. 1900 ft. A. T. Jergins Trust, Lowther 1, 5-32-13, rur.

ELKHORN—United Oil Co.'s No. 1, 2-32-21, td 150 ft, wocs. E. D. Bacon's No. 1, 22-31-21, surface formations.

CHOLAME—Willett Oil Assn's Jack 2, 10-25-15, sd 3648 ft. Bridged 3100-3000.

DOS PALOS—Pure Oil Co.'s Chowchilla 3, 17-10-14, rig.

STOCKTON—Holly Devel. Co.'s Padden 1, 16-2-5, sand and shale, td 4074 ft, drlg.

SOLANO COUNTY

RIO VISTA—Amerada Pet. Corp.'s Emigh 1, 26-4-2, shale, td 2636 ft, drlg.

TEHAMA COUNTY

CORNING—Northern Counties Pet. Co.'s Ewers-Mooney 1, 25-24-3, td 8512, sand and shale, coring.

MONTEREY COUNTY

WEST PLEYTO—Shell's Branch 1, 34-24-10, dr sand and shale 8346 ft.

SANTA BARBARA COUNTY

SUMMERLAND — Toney Carnero's Fithian 1, 8-4-24, td 1025 ft, sd.

SANTA MARIA—Hall-Baker's Preisker 1, 12-9-34, td 2200 ft, sd; Preisker 5, rur. Union's Enos 19-1, grade. E. H. Moore, Inc. Union Sugar A-1, 36-10-35, bld rig over old hole.

EL CAPITAN—La Canada Oil Corp.'s Well 1, 33-5-30, rig.

LOMPOC—Lompoc Pet Corp.'s Beauterbough 2, 18-7-24, fsh 3940 ft. York Oil Co.'s No. 3, 33-8-34, setting boilers.

CARPENTERIA—Santa Barbara Oil & Gas Co.'s Bryce 1, 29-4-25, sd 2300 ft.

POINT CONCEPTION—Union's Sudden 1, 15-5-25, sd 2221 ft.

MESA—Anacapa Oil Co. well 4, shale, td 1610 ft, drlg.

VENTURA COUNTY

SHEILLS CANYON—Bankline Oil Co.'s Calumet B-1, 3-3-19, dr gray sand 4490 ft, drlg. Petroleum Securities Co.'s Home R. 3, 3-3-19, sdy shale, 3239 ft, drlg. Texas' Shiells 129, 4-3-19, td 4812 ft, plug 4260 ft; Shiells' 130, sd and shale, td 766 ft, drlg; Shiells 131, rur.

SO. MOUNTAIN—Calco Pet. Corp.'s Calco 3, 17-3-20, shale, fsg for reamer at 3210 ft.

OJAI—Continental Oil Co.'s Pirie 2, 12-4-23, td 1017 ft, to deepen.

OXNARD—General's McGrath 2, 26-2-23, dr sand and shale 6675 ft.

SANTA PAULA — High Mesa Oil Co.'s Butcher 1, 16-4-22, td 650 ft, co. Rennie Bros' Well 1, 21-4-21, sd.

SIMI—Jas. S. Hull's No. 1, 2-2-18, td 1715 ft, drlg sand and shale.

PIRU — R. P. Johnson's Rubel 1, 21-4-18, td 1640 ft, plug 1300. Bolsa Chica Oil Corp.'s Snow 3, 4-4-18, dr hard brown shale 2088 ft; Snow 4, rur.

SESPE CANYON—Merchants Pet. Co.'s No. 1, 1-4-20, grade. Frans Nelson's 29-5-19, sd 2000 ft. Topo Topo Oil Co.'s No. 3, 33-5-19, td 1250 ft, co. Condor Oil Co. No. 1, dr shale 1171 ft, drlg. Calkan Pet. Corp, Well 1, 23-5-20, sh. td 2900 ft, drlg.

SESPE CREEK—Speik Oil Co.'s No. 1, 33-5-19, rur. Bankline Oil Co.'s Wakefield 1, sd.

BARDSDALE—Union's Dryden 10, 12-3-20, td 6055 ft, pumped 110 b. in 20 hrs. Bestco Pet. Co.'s Frey 1, 2-3-19, dr gray sand 1851 ft. El Rancho Oil Co.'s Elkins 1, 9-3-19, sd 4040 ft. Laing & Jacobs' No. 1, sd 1225 ft. Pet. Sec. Elkins 1, 7-3-19, sh, td 4049 ft, drlg.

SOUTHERN CALIFORNIA

PUENTE—Chas. R. Butler's Butler No. 1, 14-2-10, sd, 4145 ft.

NO. LONG BEACH—Geo. L. Clayton's No. 1, 31-3-12, td 6765 ft, bailing.

TORRANCE—Codri Oil Co.'s No. 1, 28-4-13, td 3568 ft, co. Eyer Pet. Corp.'s No. 1, 20-4-13, 3794 ft, prep. to pump.

ARTESIA—Davis & Lewis No. 1, 25-3-12, rig. Vanco Devl. Co.'s Millard 1, 24-3-12, will deepen.

GARDENA—A. C. Edington's No. 1, foundation.

WILMINGTON—General's No. 1, sdy sh, td 1100 ft, drlg. Harbor Drlg Co. Well 1, 33-4-13, rig. Sovereign Oil Corp.'s Banning 1, 28-4-13, td 3663 ft, prep to pump.

PUENTE—McVicar-Roods Santous 1, 6-2-9, shale 410 ft, drlg.

TOPANGA CANYON—Monarch Pet. Co.'s No. 1, 5-1-16, sd 650 ft.

WEST LONG BEACH—Shell's Amebco 1, 13-4-13, td 6387 ft, abn.

ELINDO—Shell's McKenna 1, 33-3-14, td 7352 ft, stg plugged.

DOMINGUEZ—West American Oil Co.'s Del Amo 1, 3-4-13, shale 8358 ft. Will set 8⅝-in. csg.

NEWHALL—Yant Pet Corp.'s No. 5, 1-3-16, td 2022 ft, wet. Stg recntd. Well 6, rig.

NEWPORT—Commander Oil Co.'s Mesa 1, 29-6-10, wocs, td 2121 ft.

YORBA LINDA—Continental's Carlton Com 21-3-9, td 4796 ft, testing.

WESTMINSTER—Hillman-Long's No. 1, 14-5-11, dr shell 7701 ft. Prep. to set 8⅝-in.

SUNSET BEACH—Geo. Terry's Gun Club 1, 17-5-11, td 2110 ft, dr.

SAN BERNARDINO COUNTY — Equitable Pet. Explor. Co.'s No. 1, 11-10-5, 2347 ft, drlg. Albert Pet. Co.'s Chute 1, 14-4-1, rigged up.

COLORADO

ADAMS COUNTY — Hills Dome Oil Lease Hills 1, csl se se 27-3s-64w, dr 4202 ft in sandy shale.

ARCHULETA COUNTY — Wm. E. Hughes Estate Fee 6, nw ne se 24-33n-2e, spd. Wm. E. Hughes Estate Fee 7, ne se se 24-33n-2e, mim. K. L. Kendrick, Crowley 1, 2-32n-1e, sd 1125 ft for 6¼-in csg.

HERFANO COUNTY—Collins & Quinn Fee 1, cnl nw se 4-28s-68w, making new hole at 3795 ft. Old td 4116 ft.

LAPLATA COUNTY—McGarr Petroleum Co. 1, csl ne ne 27-33n-12w, dr 3200 ft.

LINCOLN COUNTY—Consolidated Smelting and Metals Corporation Hancock 1, ne sw 7-17s-52w, lowering 8¼-in csg from 1975 ft to 2001 ft to shut off water.

ROUTT COUNTY—Mid-Colorado Petroleum Co. Ohmholt 1, nw ne 29-4n-87w, sd 2910 ft.

MONTEZUMA COUNTY — Coon & Teague (McElmo Oil Co.) West 1, ne nw nw 31-36n-17, fsg tools at 3705 ft.

MORGAN COUNTY—Swisher et al Lunt 1, sw sw sw 3-5n-60w, sd 1449 ft.

PARK COUNTY—South Park Oil Co. State 1, se se sw 16-11s-75w, td 4164 ft. Swabbing 15 bbls oil per hour. Will deepen, set the 6¼-in csg at 4152 ft. South Park Oil Co. LeBert 1, ne ne nw 21-11s-75w, spd.

WELD COUNTY—Continental Oil Co. State Bank of Trenton 1, csw ne 21-8n-59w, spd.

FLORIDA

JACKSON COUNTY—Mrs. Mamie Hammonds et al's Grandberry 1, sw ne 15-5n-9w, sd 240 ft.

LAKE COUNTY—Oil Dev. Co. of Fla's Gulf Expl. Co. 1, se se 17-24s-25e, elev 120 ft top Selma chalk 3400 ft arr core 3700 ft. Selma chalk.

NASSAU COUNTY — St. Mary River Oil Corp. (J. E. Brown et al) Bank of Hilliard 1, nw nw se 19-4n-24e, dk.

POLK COUNTY—Dr. Edw. A. Hill's Polk County Lbr. Co. 1, nw ne 32-25s-25e, dk.

KANSAS

BARTON COUNTY — Morgan & Flynn et al's Zimmer 1, se se sw 30-19s-14w, dr 3586 ft. Simpson, Noble & Atlantic's Hiss 1, cnw ne 31-20s-13w, td 3290 ft, swab 230 bbls oil. Murphy & Morgan's Robinson 1, ne ne sw 21-16s-14w, dr 3460 ft. Merriam's Soaken 1, sw sw se 21-17s-11w, td 3300 ft, D&A Davison et al's Birzer 1, sw se sw 22-17s-12w, dr 2340 ft. Ramsey et al's Hunt 1, nw nw nw 10-18s-11w, td 3404 ft, pb 3402 ft, no increase, pb 3400 ft. Buchanan & Alexander's Langford 1, ne ne sw 14-20s-11w, td 3290 ft, swab 15 b.o.p.h., 1000 gals acid, no test. Schermerhorn Oil Co.'s Hunter 1, ne ne ne 29-18s-15w, running 8-in csg 3180 ft. Wakefield & Johnson's Bumm 1, sw ne ne 22-19s-12w, dr 625 ft. Rose & Lant's Redetzke 1, ne nw nw 10-16s-11w, ru. Price et al's Ehrlich 1, nw nw se 10-16s-13w, td 3442 ft, D&A. Rosespring Drlg et al's Rick 1, sw sw sw 1-19s-11w, rig. Burton's Wendel 1, ne ne ne 13-19s-11w, sd 63 ft.

BUTLER COUNTY—Ellis et al's Pettit 1-A, se se nw 21-28s-6e, dr 885 ft. Sanford et al's Weaver 1, se se ne 11-28s-5e, dr 1495 ft. Dalton et al's Miley 1, csw ne 17-27s-5e, ru.

COWLEY COUNTY—Roth & Faurot's Guthrie 1, se ne nw 30-33s-8e, hfw 3146 ft. DeGenther Oil Co.'s Holt 1, nw nw se 15-30s-5e, ru. Cameron & Pulse's Simpson 1, cne nw 3-30s-4e, ru. Wakefield et al's Daniels 1, se sw se 3-30s-3e, dr 522 ft. Braden Prod Co.'s Sparks 1, se se nw 35-33s-4e, dr 270 ft. McKnapp's Community 1, cne nw 14-34s-3e, rig. Benedum & Trees' No. 1 Carson, sw sw nw 8-30s-4e, ru mach. Mickleson et al's Wallace 1, sw se se 10-33s-4e, td 35 ft, D&A.

EDWARDS COUNTY — Stanolind-Elwell's Donovan 1, sec se 14-25s-18w, dr 3300 ft.

ELLIS COUNTY—Jones Bros. & Carpenter et al's Solomon 1, se se sw 28-11s-19w, dr 2630 ft. Twin Drlg. Co.'s Reidel 1, sw sw ne 27-13s-16w, td 3536 ft, D&A. Brunson & Ewers-Simpson's Gross 1, ne ne sw 29-14s-17w, sd 3075 ft. Bridgeport & Hall's Madden Estate 1, ne nw nw 26-15s-18w, dr 1880 ft. Lario O&G Co.'s Walter 1, se ne sw 2-12s-18w, ur 8-in csg 3072 ft. Tom Palmer's Schoenthaler 1, ne ne nw 31-12s-19w, dr 2385 ft. Harris & Haun et al's Schmeidler 1, se se sw 3-13s-17w, dr 1100 ft. Yarnell & Carlson's Phillips 1, nw nw se 2-14s-18w, dr 2035 ft. Wolf Creek et al's Polifka 1, sw sw ne 24-13s-18w, cellar. Rosespring et al's Union Pacific 1, ne ne ne 9-13s-20w, rur. Empire's Herl 1, se se se 22-15s-19w, ru. Twin Drlg Co.'s Copeland 1, ne ne sw 26-14-19w, dr 1017 ft. James Brouk et al's Jacobs 1, nw nw se 31-15s-16w, br.

ELLSWORTH COUNTY—Empire's Kroesch 1, nw nw se 33-17s-9w, dr 3221 ft.

FINNEY COUNTY—Lone Star State Drlg Co.'s Hamlin 1, sw sw ne 31-24s-34w, dr 2339 ft.

GRAHAM COUNTY—Vickers and Phillips' Hutton 1, ne ne se 29-8s-22w, dr 2470 ft.

GREENWOOD COUNTY—McGinnis' Dater 1, nw nw sw 11-24s-8e, dr 1910 ft. McGinnis' Lampe 1, nw ne sw 26-24s-8e, ru.

HARVEY COUNTY — Harburney Oil Co.'s Scrag 1, nw nw se 24-22s-3w, sd 2796 ft. Shawver's Judd 1, sw se ne 3-24s-2e, rig.

HASKELL COUNTY—Helmerich & Payne et al's Jones 1, cse 34-26s-34w, rig.

KINGMAN COUNTY—Lauck et al's Prather 1, cse 18-27s-8w, rig. Oklahoma Oil Corp. et al's Reeves 1, nw nw nw 29-27s-5w, brr.

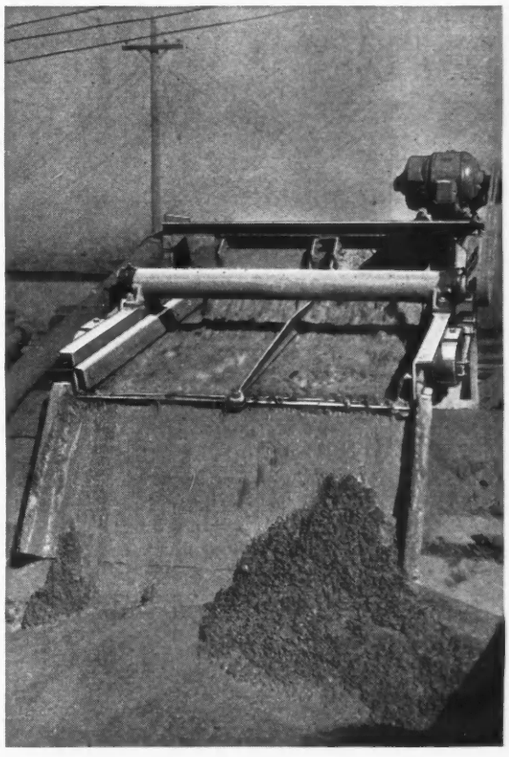
McPHERSON COUNTY—Empire's Cunningham 1, se se se 26-18s-1w, dr 1735 ft. Johnson et al's Johnson 1, sw sw nw 33-17s-1w, ru.

NESS COUNTY—Continental's Thompson 1, ce½ e½ sw 13-18s-26w, set 7-in csg 4445 ft, wocs.

RENO COUNTY — Helmerich & Payne's Schwaiger 1, sw se ne 27-26s-5w, abn 4140 ft. Dickey Oil Co.'s Shepherd 1-A, ne ne nw 22-26s-9w, td 4161 ft, pb 4156 ft. Cheney et al's Moore 1, ne ne ne 14-26s-8w, dr 3350 ft. Foraker et al's Hiett 1, se sw ne 34-24s-4w, co 2880 ft. Rosespring et al's Swanson 1, ne ne nw 1-23s-5w, mim.

RICE COUNTY—Gratton et al's Williams 1, sw sw nw 17-18s-7w, sd 3213 ft. Gilmac Oil Co.'s Sargent 1, se se se 31-18s-6w, sd 865 ft. Dickey and Continental's Newkirk 1, ne ne sw 11-18s-7w, dr 3225 ft. Witt's Hall 1, se se nw 3-20s-9w, abd 3252 ft. Duwe & Schneider's Wright 1, ne ne ne 36-21s-7w, fsg 3085 ft. Simpson & Noble et al's Pulliam 1, cs½ n½ ne 35-19s-8w, report last week in error, dr 1850 ft. Skiles et al's Stout 1, se se se 6-21s-9w, dr 1615 ft. Beardmore et al's Fuller 1, sw sw se 23-18s-7w, dr 1910 ft. Sage et al's Patton 1, sw sw sw 5-21s-7w, rig. Permian Oil Co.'s Monroe 1, cne ne 9-20s-7w, sd 2605 ft. Simpson-Noble & Stan-

How to Recondition Your ROTARY MUD at Lowest Cost



Use the Link-Belt vibrating screen and—

- Save mud and keep it in constantly good condition.
- Save pump parts from undue wear.
- Simplify entire system by reducing size of slush and reject pits.
- Avoid blowouts.
- Reduce gas cutting to a minimum.

● The Link-Belt screen has many exclusive advantages such as—larger screening area—longer life of screen cloth—ease of transportation—minimum head room required, etc. Address Link-Belt Company, Philadelphia, Los Angeles, New York, Houston (Fred Wallace, 4317 Montrose Blvd.) or Oklahoma City (W. H. Abele, Box 305, Route 4.)

LINK-BELT VIBRATING SCREEN

5708

olind's Bowman 1, sw sw nw 22-19s-10w, lcn. Shell's Maughlin 1, ne nw se 11-20s-8w, dr 1100 ft. Shell et al's Hafferman 1, cn½ n½ se 6-19s-9w, brr.

ROOKS COUNTY—Murfin et al's Wasthusin 1, ne ne se 12-6s-18w, dr 2725 ft. Skaer Oil Corp. & Reese's Dryden 1, ne ne ne 28-10s-17w, dr 1220 ft. Lester & Dean's Burtt 1, se se ne 29-10s-20w, dr 1000 ft. Hartman & Blair's Hall 1, nw nw nw 25-10s-17w, ur. L.C.D. Drlg. Co. et al's Westhusin 1, cne se 11-9n-17w, br. Trees Oil Co.'s Minx 1, sw sw sw 31-10s-18w, lcn. Shoemake's Stebbins 1, ne ne sw 26-7s-17w, lcn.

RUSH COUNTY—Pryor & Lockhart's Stegman 1, sw nw ne 11-16s-17w, set 15-in csg 542 ft, wocs. Rosespring et al's Jacobs 1, sw se nw 8-16s-17w, dr 3430 ft. Boyle & Grossman's Wilson 1, ne ne ne 33-17s-19w, dr 1190 ft. National Ref. Co.'s Werth 1, nw ne ne 7-16s-18w, dr 3100 ft.

RUSSELL COUNTY — Bridgeport and Lauck's Wycoff 1, se nw ne 27-11s-13w, abd 3460 ft. Berry et al's Cook 1, ne ne se 19-11s-13w, running 8-in csg 3107 ft. Eisenhour & Shaffer's Humes 1, sw sw sw 6-14s-12w, dr 2900 ft. Darby and Continental's Letsch 1, se ne nw 34-14s-13w, td 3265 ft. Central Pet. Co.'s Furthmeyer 1, ne ne ne 28-14s-15w, dr 2800 ft. Stearns & Streeter et al's John Hancock Insurance 1, se sw sw 31-12s-14w, so 2815-2820 ft. Wakefield et al's Krug 1, ne nw sw 7-15s-14w, spd. Coralena Oil Co.'s G. M. Sellens 1, sw se sw 20-15s-13w, dr 1570 ft. Hartman & Blair's Johnston 1, nw nw nw 11-13s-14w, rig. Lario O&G Co. et al's Steinert 1, nw nw sw 21-15s-15w, cellar. Reynolds' Fredrickson 1, se sw se 6-13s-12w, dr 3130 ft. Equity Gas Co.'s Harbauh 1, nw ne sw 19-13s-12w, cellar.

SALINE COUNTY—James Brouk et al's Othelander 1, ne nw se 10-16s-3w, br.

SEDGWICK COUNTY — Dickey Oil Co.'s Ayers 1, sw sw nw 12-27s-2e, fsg 2617 ft. Joe Aylward et al's Harrison 1, se se sw 23-25s-2e, rig. Lauck's Parke 1, se se ne 17-25s-2e, dr 685 ft.

STAFFORD COUNTY—Stanolind-Atlantic's Shotton 1, sw sw sw 27-22s-13w, so 3549-3563 ft.

SUMNER COUNTY—Helmerich & Payne et al's Elwell 1, nw nw ne 18-34s-1e, sd 4000 ft. Wilcox O&G Co. et al's Hess 1, se se nw 13-23s-2w, dr 4174 ft. Matthews & Derrington's Berry 1, nw nw se 14-35s-1e, sd 2306 ft. Wilson et al's Clark 1, csl nw 15-35s-1w, fsg 4170 ft. Craft & Wilson's Nevitt 1, ne nw ne 36-32s-2e, dr 2630 ft. Pryor & Lockhart et al's Knowles 1, sw sw sw 30-30s-1e, td 3496 ft, rust. Texas Co.'s Reed 1, ne se se 11-31s-1w, rur.

TREGO COUNTY — Central Commercial's Wagg 1, nw nw se 17-13s-21w, dr 3972 ft. Hall et al's Deines 1, se se se 12-13s-24w, ru.

WOODSON COUNTY—Sheedy's Baker 1, se se nw 2-26s-14e, td 1560 ft, pb 1416 ft. Mendenhall et al's Hunter 1, ne ne ne 36-25s-14e, dr 1110 ft. Foster et al's Timm 1, se nw ne 36-25s-13e, td 612 ft, pb 607 ft. Roy Johnson's Hare 1, cn½ ne 32-25s-14e, dr 1247 ft.

SOUTH LOUISIANA

ACADIA PARISH—Magnolia's Homeseekers 1, Esterwood prospect, sec 54-10s-1w, dr shale 7430 ft.

ALLEN PARISH — Humble's J. A. Bell 1, Reeves prospect, sec 28-6s-7w, running electrical logging device 7050 ft.

AVOYELLES PARISH—Frost Oil Co.'s Hinds Lbr Co. 1, n of Marksville, sec 3-3n-4e, dk.

CAMERON PARISH—Magnolia's A. Hebert 1, Big Lake, sec 13-12s-9w, dr shale 6630 ft.

EAST FELICIANA PARISH—East Feliciana Oil Corp.'s Rider 1, sec 58-1s-1w, abn lcn. Cavalier Oil Co.'s Vignes 1, ne of Nettie, sec 40-8s-3e, pits.

IBERIA PARISH—Texas Co.'s State Fausse Point 2, Fausse Point, sec 35-11s-8e, mim. Jefferson Lake Oil Co.'s Lake Pigneur 274, Jefferson Island dome, 12s-5e, sd 8610 ft.

JEFFERSON DAVIS PARISH—Shell's Lacassine 1, Hayes prospect, sec 20-11s-5w, running seven-in csg to 9523 ft. Strake Petroleum Corp.'s Miller Estate 1, Woodlawn prospect, sec 7-9s-5w, dk.

LIVINGSTON PARISH—Bunte Oil & Gas Co.'s Davis 1, Denham Springs area, sec 7-7s-3e, dk.

ST. JAMES PARISH—Shell's Colonial Sugar 1, Convent prospect, sec 5-12s-5e, dr shale 7015 ft.

ST. LANDRY PARISH—Limited Oil Co.'s Miller Est 1, Cankton prospect, sec 47-8s-4e, dr 7630 ft.

ST. MARTIN PARISH — Texas Co.'s Lake Mongouloi 2, Lake Mongouloi prospect, sec 14-10s-9e, woc 1241 ft; same operator's St. Martin Land Co. 8, Henderson prospect, sec 9-8s-7e, washing 8160 ft.

VERMILION PARISH—Continental's O. C. Hebert 1, Abbeville prospect, sec 20-12s-3e, dr shale 6899 ft.

VERNON PARISH—Llano Oil Corp.'s Llano 1, 7-1n-9w.

WEST FELICIANA PARISH—Southern Minerals Corp.'s M. B. Wood 3, Weyanoke prospect, sec 54-1s-4w, ru.

NORTH LOUISIANA

BIENVILLE PARISH—Rondeau et al's Locke 1, ne nw ne 9-15n-10w, elev 180 ft rur. Walters et al's Davis 1, 3-16n-9w, mim.

BOSSIER PARISH—Bowman-Tidwell's Nattin 1, 15-22n-14w, dr 789 ft. Producers O&G Co.'s J. A. Skannal Est 1, C frac sw sw 22-17n-12w, rur. United Gas Pub Serv Co.'s Skannal Est D-1, se ne 22-17n-12w, rur.

CADDO PARISH — Pyramid O&G Co.'s Wheeler A-1, 16-18n-16w, elev 250 ft top anhydrite 3783 ft 9⅝-in csg 3950 ft base massive anhydrite 4704 ft cored lime showing gas 4826-49 ft core dense lime & shale 5108 ft. Forbing-Persian Oil Co.'s Cupples 1, 24-16n-13w, rur. Henderson et al's Fee 1, 5-19n-15w, dk & mir.

CATAHOULA PARISH—T. R. McDermott's Catahoula Lake 1, 15-10n-5e, bldg dk.

CALDWELL PARISH—Critchett & Wood's La. Cent Lbr Co. 1, 18-11n-3e, dr 1280 ft.

CLAIBORNE PARISH—Sugar Creek Synd. et al's Darrett 2, 31-20n-5w, elev 324 ft tested 18 thribbles sw 6696-6761 ft core 6893 ft. Kilpatrick 1, sw ne 7-19n-5w, elev 266 ft completed 5 mil ft gas 2310 pounds rock pressure, td 5811 ft 7-in csg 5407 ft. E. T. Oakes et al's Patton Est 2, 1-20n-5w, woc 10-in csg 1402 ft.

DE SOTO PARISH—Tarbud Oil Co.'s Caddo Realty 1, nwc 2-13n-16w, spd dr 1000 ft.

FRANKLIN PARISH—S. C. Jensen's Bailey 1, 12-11n-6e, dr 1217 ft shale.

JACKSON PARISH—Zeigen et al's La Cent Lbr Co. 5, ne nw 13-14n-2w, wodd, td 1770 ft.

LINCOLN PARISH—Lide & Greer's S. Gardner 1, 10-17n-4w, tested 44 joints sw & 20 joints mud in eight minutes in ds test 5630-5732 ft, core 5774 ft lime & shale.

MOREHOUSE PARISH—Henry E. Rondeau et al's Clark 1, se ne 10-20n-7e elev 90 ft rur.

RAPIDES PARISH—Texas Eagle Oil Corp et al's State 1, 5-1s-2e, tested 30 to 40 mil ft gas through ¼-in choke 400 pounds pressure 5693-5703 ft, arr set csg.

RED RIVER PARISH—I. J. Allen's Franklin Realty Co. 7, ne ne 20-11n-9w, dr 2140 ft shale. H. D. Conley et al's Long-Bell 1, 19-13n-9w, rur. T. B. Shaw et al's Teekel 1, 34-13n-10w, lcn.

SABINE PARISH—Keen et al's Long-Bell 1, 5-8n-13w, rur. Whitehurst et al's Whitney Corp 1, (formerly Laurel Pet Co.), 8-9n-13w, dr 1800

An End to Black Magic!

In the early days, the secret continuances of Black Magic were the tools of the prospector, and an awed world watched the wonder of the magician with a wiggle stick. A far cry from today's modern methods, from today's trained engineer prospecting with such modern geophysical instruments as Torsion Balances, Seismic Equipment and Magnetometers. Sound physical principles and engineering skill have put an end to prospecting Black Magic.

Many important prospects and fields have been discovered with Askania Torsion Balances. These popular instruments give the prospector fast, economical, permanent gravity surveys, data from which have been proved reliable.

The Askania Magnetometer, for reconnaissance and detailed magnetic work, is another tested instrument. It is used everywhere; improved equipment and advanced field technique have given this instrument a much greater versatility than formerly and considerably widened the range of its applicability.

For detailed surveys, modern Seismic Reflection Equipment, designed according to sound physical principles, represents a valuable addition to the prospector's tool chest. Most of the larger operating companies are using Seismic equipment to supplement knowledge of the subsurface obtained through geological investigations or by drilling.

Modern Askania Equipment is a valued ally of the mining and oil prospector. As new methods of prospecting are developed and new instruments designed, the prospector will find, in the future as in the present, the Askania trademark the symbol of reliable, economical equipment for furnishing him with dependable data.

AMERICAN ASKANIA CORP.

ASKANIA

M. & M. Building, Houston, Texas

ft. Annona chalk. A. H. Tarver's Baker 2, 36-8n-12w, elev 347.5 ft top Zwolle marl 2205 ft going over hung drill pipe with csg, td 5225 ft. Claude H. Smith et al's Whitney Corp 1, 19-10n-13w, arr made ds test after reported so 3053 ft.

TENSAS PARISH — H. M. Jones' Chicago Mill & Lbr Co. 1, nw sw nw 29-12n-10e, base Jackson 776 ft tested est 5 mil ft wet gas setting 8-in csg td 779 ft. Clara Nook Plant 1, nw sw 33-12n-10e, rur. Chicago Mill & Lbr Co. 2, sw se 12-11n-9e, lcn.

UNION PARISH — Lent, Sears & Bocher's Frost Lbr Co. 1, nec 27-21n-1e, dr 3931 ft black shale.

WEBSTER PARISH—J. P. Evans' Crichton 1, 35-18n-9w, elev 214 ft top first anhydrite 4700 ft base massive anhydrite 5189-98 ft cored dense lime 5495-5502 ft to 5512 ft sandy lime slight saturation, to 5513 ft dense lime and to 5520 lime slight so&sg porosity 15 per ct. cemtd 6⅝-in csg 5363 ft td 5532 ft last 12 ft dense lime. Ohio Oil Co.'s R. L. Holloway 6, ne sw 23-21n-10w, elev 210 ft dr 7465 ft hd red shale. Red Hawk Oil Co.'s Baker 1, se nw 9-23n-9w, rur. J. L. Edwards' Hooper 1, 8-17n-9w, elev 173 ft fsh slip 2550 ft.

MICHIGAN

ARENAC COUNTY—Arenac Oil Co.'s Griffin 1, 19n-5e-1, sd 100 ft. Redman Oil Co.'s Kahyda 1, 20n-3e-9, sd 2940 ft. Ernest Snyder's Clukey 1, 20n-6e-8, dr 1000 ft.

BAY COUNTY—Henry L. McEvoy's Glander 1, 19n-3e, sw se ne-18, sp. A. H. Weber's DeLong 1, 16n-3e, se se se-35, lcn.

CLINTON COUNTY — Petroleum Exploration's Cable 1, 5n-2w-12, dr 1200 ft.

CHIPPEWA COUNTY—F. D. Barton's Kretan 1, 41n-7e-17, dr 423 ft.

CRAWFORD COUNTY — T. F. Caldwell, Inc.'s Huston-Lincoln 1, 25n-1w-7, sp.

CLARE COUNTY—Fortney Oil Co.'s Neville 1, Surrey twp, sec 26, dr 400 ft. Fred Seigle's Fee 1, 17n-5w-26, sd 1150 ft.

GLADWIN COUNTY—T. F. Caldwell, Inc.'s Parker 1, 18n-2w-21, csg 6-in 1645 ft. Mammoth Petroleum Corp.'s Mellinger 1, 18n-2w-35, Dundee 3898 ft, dr 3972 ft. Chas. Bell's Ross 1, 18n-2w-34, dr 3700 ft. Goll, Graves and Mechling's Oard 1, 18n-1w-25, rig; State 1, 19n-2e-30, dr 1300 ft.

GRATIOT COUNTY—McPherson Company's Sharrar 1, 11n-4w-11, sd 2855 ft, so&w, to deepen. Harley William's Smith 1, 9n-2w-29, sd 2100 ft. Gulf Refining Co.'s Redman 1, 12n-1w-1, dr 1400 ft.

HURON COUNTY—Wallace Markle's Opaka 1, 15n-11e-4, sd 3005 ft, to acdize.

IONIA COUNTY—Frank Lyon's Geiger 1, 8n-8w-29, dr 2700 ft. Terry Dale's Tew 1, 6n-7w-12, dr 2450 ft.

ISABELLA COUNTY—Pure Oil Co.'s Comstock 1, 13n-6w-15, dr 3400 ft. Geo. Hanner's Dargitz 1, 13n-6w-20, dr 3099 ft. J. C. Aber's Murphy 1, 14n-5w-12, fsg 1400 ft.

KENT COUNTY—James Barton's Smith 1, 10n-10w-29, dr 2300 ft. Mich. Oil Exploration's Croff 1, 7n-9w-35, sd 2700 ft.

MONROE COUNTY—Trenton Oil Co.'s Stone 1, 7s-6e, se se se-24, lcn.

MONTCALM COUNTY—John Martin's Chistensen 1, 10n-6w-20, dr 2300 ft. Morris Oil Co.'s Young 1, 10n-6w-36, dr 900 ft. Terry Dale's Higgins 1, 9n-8w-13, dr 600 ft. Jetter Oil Co.'s McCracken 1, 9n-5w-6, dr 3100 ft. Star Petroleum Co.'s Ward 1, 9n-5w-20, re-cementing 5-in csg, td 3132 ft. Michigan Gas & Oil Co.'s Youngs 1, 9n-6w-1, dr 2900 ft. Jetter Oil Co.'s De Hart 1, 9n-6w-1, rig. W. E. Voss' Bristol 1, 10n-8w-23, rig. McClanahan Oil Co.'s Lincoln Nat'l Life 1, 12n-5w-29, csg 6-in at 1492 ft. Durham & Jones' Towle 1, 11n-8w-15, dr 900 ft.

SAGINAW COUNTY—St. Louis Pipe & Supply Co.'s Yadovack 1, 10n-2e-13, sd 2853 ft. T. F. Caldwell, Inc.'s McDonagh 1, 10n-5e-19, dr 400 ft. J. H. Hibbard's Woodward 1, 10n-5e-22, rig. B. J. Skinner's Sheldon 1, 10n-3e-11, dr 2100 ft.

SHIAWASSEE COUNTY—Frank C. Cheer's Wilson 1, 6n-3e-34, dr 2200 ft. Cardinal Crude Oil Co.'s Haviland 1, 5n-3e-31, sd 2300 ft.

TUSCOLAX COUNTY — V. R. Kirkham's Boyce Farm 1, 14n-7e-24, dr 1600 ft.

WAYNE COUNTY—Lee Brown's Spicer 1, 2s-3e-6, or 4350 ft.

MONTANA

CARBON COUNTY—Bailey Round Butte Oil Co. 1, ne se 3-6s-22e, sd 1485 ft.

FERGUS COUNTY—H. C. Rowland Gov't 3, cel ne sw 18-17n-24e, dr 250 ft. Minnesota Co. Fenholt 1, se nw sw 24-21n-17e, fsg 1100 ft. Judith Operating Co. Government 2, w nw ne 35-22n-17e, dr 902 ft.

GLACIER COUNTY—L. P. Jackson and Stanley Gray Dunbar 1, nw se nw 22-34n-7w, cemented 10-in csg at 1165 ft.

PONDERA COUNTY—Texas Co. 1, Unit 1, cnw se 32-31n-5w, dr 710 ft. Norden Corp. Hollan 1, nw nw nw 12-28n-6w, dr 2067 ft. R. C. Tarrant Wallenstein 1, nw nw sw 9-29n-5w, ru. Gordan Campbell Hughes 1, nw ne nw 12-30n-4w, spd.

TOOLE COUNTY—Boyd Kyle 3-37n-1e, spd in and sd to complete.

MISSISSIPPI

CLAIBORNE COUNTY — Claiborne O&G Co.'s Crawford 1, 6-13n-4e, elev 115 ft arr deepen td 600 ft gumbo.

JONES COUNTY — Snow-Black Pet. Co.'s Fox 2, 31-7n-12w, arr set 12½-in csg below 800 ft.

LAMAR COUNTY—Snow-Black Pet. Co.'s Miller et al 1, ne sw 3-4n-15w, woc 1446 ft.

WASHINGTON COUNTY — Mid-Continent Dev. Co.'s Lee 1, 1-14n-8w, elev 120 ft, ran electrical tester at 3455 ft lime.

WILKINSON COUNTY—Kirby Pet. Co.'s Lanehart 1, 22-1n-2w, coring 4036 ft.

NEW MEXICO

LEA COUNTY—Amerada's Chas. H. Weir 1-B, c sw ne 26-19s-36e, elev 3675 ft, tested gas with spray oil 4000 ft, dd to 4030 ft and shot 320 qts nitro at 3840-4000 ft, testing. Barney Cockburn & Rowan-Nichols Oil Co.'s H. G. Mattern 1, c sw se 7-22s-37e, elev 3426 ft, cem cas 1045 ft. C. & G. Oil Co.-The Texas Co.'s Ellen Weir 1, c ne ne 14-20s-37e, elev 3564 ft, top anhydrite 1348 ft, dr 3115 ft. Conoco & California Co.'s E. M. Elliott 1, c sw sw 22-22s-37e, elev 3347 ft, cem 7-in csg 3323 ft; Elliott 1-A-15, se se se 15-22s-37e, lcn; Elliott 1-A-21, c se se 21-22s-37e, lcn; Ira C. Farney 1, c sw se 5-23s-36e, lcn. Culberson, Erwin & Stovall's J. B. Humphreys-Humble 1, c se sw 3-25s-37e, elev 3135 ft, top anhydrite 1030 ft, top salt 1124 ft, top pay 3620 ft, td 3700 ft sd with 700 ft oil in hole; J. R. Stuart-Repollo 1, c sw se 10-25s-37e, elev 3105 ft, top anhydrite 1035 ft, salt series 1250-2405 ft, top lime 2430 ft, sandy-lime pay 3280-94 ft, flowed 148 bbls oil in two hrs on ¾-in tubing choke. Gulf Oil Corp.'s S. J. Carr 1, c nw sw 3-24s-37e, dr 220 ft; E. A. King 1, c sw nw 28-21s-37e, elev 3469 ft, dr 1420 ft; Frona Leck 1, c nw ne 14-21s-36e, elev 3578 ft, dr 2680 ft; L. M. Buffington 1, c nw sw 13-25s-37e, dr 575 ft; W. T. McCormick 1, c ne ne 32-21s-37e, elev 3464 ft, dr 850 ft; A. B. Reeves 1, c nw sw 29-20s-37e, elev 3529 ft, base salt 2400 ft, td 3844 ft sd for acid with 3000 ft oil in hole; J. A. Stuart 1, c sw ne 10-25s-37e, elev 3120 ft, rotary rig. Humble's W. B. Farrell 1, c sw se 22-22s-37e, elev 3341 ft, dr by tools, td 830 ft; G. B. Hadfield

GARLOCK
7021
for
EXTREME
PRESSURES
GASKETS cut from GARLOCK 7021 Compressed Asbestos Sheet give exceptional service on pipe lines and other equipment handling gasoline, oil, gas or steam at high temperatures and extreme pressures. Tough, yet resilient—GARLOCK 7021 is particularly economical and efficient for severe conditions.
THE GARLOCK PACKING COMPANY
Palmyra, New York
Tulsa, Okla.
Houston, Texas
Los Angeles, Calif.
See us at the Tulsa Show
Booths 59 and 60, Texas Bldg.

1, c nw se 21-25s-37e, elev 3082 ft, dr 390 ft; J. T. Lanehart 1, c ne sw 21-25s-37e, elev 3068 ft, dr 585 ft. Landreth Prod. Corp.'s E. H. Grizzell 1, cse sw 5-22s-37e, elev 3437 ft, rust, td 1256 ft. Liberty Oil & Drl. Co.'s J. F. Hair-Repollo 1, sw sw se 24-24s-37e, elev 3157 ft, contract completed, sdo 3702 ft. Magnolia's Will Cary 1, c ne se 21-22s-37e, elev 3361 ft, top anhydrite 1108 ft, rust, td 1350 ft; E. A. Carson 1, c nw sw 28-21s-37e, cem sur cas. Maljamar O&G Corp.'s M. E. Baish 6, c nw se 21-17s-32e, Maljamar area, elev 4028 ft, td 4129 ft, used 2000 gals acid, est 65 bbls oil with water, to pb. Ohio Oil Co.'s W. H. Turner 1, c ne se 29-21s-37e, elev 3477 ft, dr 2575 ft. N. G. Penrose & Rowan-Nichols Oil Co.'s Will Cary-Humble 2, c ne sw 22-22s-37e, elev 3345 ft, dr 3460 ft; Cary-Humble 3, c se nw 22-22s-37e, elev 3364 ft, rust, td 1150 ft; Cary-Humble 4, c sw nw 22-22s-37e, cem cas 1146 ft. Plains Production Co.'s R. L. Mosley-Repollo 1, c nw se 34-24s-37e, elev 3168 ft, top anhydrite 1000 ft, sul w at 3550-51 ft, pb to 3530 ft, flows 32 bbls oil and 3,500,000 ft gas daily; Geo. Smith-Humble 1, c se se 4-25s-37e, elev 3174 ft, dr 3450 ft. Repollo Oil Co.'s E. H. Bolding 1, nw nw nw 10-20s-37e, elev 3551 ft, dr 4104 ft; M. J. Boyd 1, swc n½ 23-22s-37e, elev 3337 ft, so&g 3537-44 ft and 3568-80 ft, testing; R. M. Jones 1, nw se nw 35-22s-36e, elev 3526 ft, cem cas 3404 ft; J. T. Lanehart 1, se nw nw 28-25s-37e, elev 3028 ft, sd for w, td 816 ft; W. C. Roach 1, nw nw nw 21-20s-37e, elev 3530 ft, td 3830 ft, swabs & flows 50; Frances Stuart 1, se nw se 10-25s-37e, elev 3114 ft, rig; J. H. Williams 2, sw sw se 33-19s-37e, elev 3568 ft, td 3915 ft, est 180 bbls natural. Samedan Oil Corp.'s Marshall 1, c sw nw 12-21s-36e; rur; C. U. Parks 1, sw sw sw 14-22s-37e, elev 3339 ft, dr plugs 3273 ft. Skelly Oil Co.'s Baker 1, c nw nw 27-22s-37e, lcn; Ellen Sims 1, c nw se 3-23s-37e, mim; Stuart 1, c ne nw 15-25s-37e, lcn. Sun Oil Co.'s B. T. Lanehart 1, c se se 20-25s-37e, elev 3042 ft, sd repairs 681 ft; A. D. Richards 1, c ne se 6-23s-37e, elev 3376 ft, top anhydrite 1215 ft, base salt 2610 ft, tested few gals oil with w at 3774 ft, sd for shot, td 3798 ft; J. R. Stuart 1, c nw ne 15-25s-37e, base salt 2442 ft, oil pay 3362-72 ft, td 3380 ft, swabs 40 bbls 38 grav oil daily, sd for shot; W. W. Weatherly 1, c ne sw 17-21s-37e, elev 3485 ft, top anhydrite 1335 ft, salt series 1350-2486 ft, td 3815 ft, testing after 4000 gals acid. The Texas Co.'s W. T. Lanehart 1, c ne¼ 29-25s-37e, elev 3031 ft, top anhydrite 965 ft, base salt 2335 ft, td 2788 ft, cementing off heavy gas. Tide Water's Anna Walden 1, c se ne 21-22s-37e, elev 3352 ft, sd 340 ft.

OKLAHOMA

ATOKA COUNTY — Riverland O&G Co.'s Jones 1, sw sw ne 4-3s-9e, dr 1405 ft.

BECKHAM COUNTY—Carter's Davidson 1, cnw sw 2-9n-25w, testing 3660-3670 ft, to dd. Jo-Gail Drlg. Co.'s Gilliland 1, cne ne 33-8n-26w, lcn.

CADDO COUNTY—Denver P&R Co.'s Sah-Cam 1, cse se 33-10n-10w, td 8147 ft, D & A.

CARTER COUNTY—Carter et al's Leon Voorhees 1, cse sw 34-5s-2w, td 4900 ft. Hammond's Lile 1, sw se se 8-5s-1e, dr 130 ft.

CLEVELAND COUNTY—Sinclair Prairie et al's Franklin 1, se nw se 21-10n-2w, td 7291 ft, ru to dd.

COAL COUNTY—Shell's Hill 3, se se nw 30-3n-10e, coring 6167 ft.

COMANCHE COUNTY—Meiling's Miller 1, ne ne sw 23-4n-12w, td 995 ft, D & A.

COTTON COUNTY — English Drlg. Co.'s Wilson 1, nw nw se 7-4s-11w, dr 1514 ft.

GARFIELD COUNTY—Sherry et al's Hoken 1, nw nw sw 32-20s-4w, dr by 6100 ft. Stanolind-Amerada's Brunken 1, sw sw ne 32-23n-4w, cemented off water, wocs.

GARVIN COUNTY—Carter et al's Wood 1, nw sw se 5-4n-3e, dr 2360 ft. McElreath & Suggett's Lasater 1, se se sw 2-2n-1w, mit.

HARMON COUNTY—Lioalko Trust Ltd.'s Crasnoe 1, se se sw 14-3n-25w, sd 2263 ft.

HUGHES COUNTY—Phillips' Eberle 1, ne ne sw 12-5n-9e, dr 4848 ft. Sivils et al's Montgomery 1, nw sw nw 7-9n-9e, set 8-in csg 3104 ft & sd. Sinclair Prairie et al's Wilkey 1, sw sw sw 23-9n-8e, rur. Blackwell O&G Co.'s Long 1, se ne nw 29-9n-9e, dr 1015 ft.

JACKSON COUNTY—Jackman's Fee 1, sw sw sw 27-1s-24w, dr 2583 ft. Burnham's Oliver 1, nw nw se 26-1s-20w, sd 1685 ft. Universal Oil Co.'s Briscoe 1, nw sw ne 36-1s-20w, dr 2960 ft. John Dickson et al's Wright 1, ne nw se 19-1n-19w, mit. Pioneer O&G Co.'s Rawls 1, sw nw ne 26-1s-20w, sd 26 ft.

JEFFERSON COUNTY—Campbell's Trout 1, se ne ne 6-8s-7e, sd 2560 ft.

JOHNSTON COUNTY—Moore & Wirick's Westheimer & Daube 1, se nw ne 19-3s-4e, dr 3830 ft. Magnolia's Green 1, ne ne ne 12-2s-7e, dr 2100 ft.

KAY COUNTY—Allen & Texas Co.'s Fulton 1, se se se 18-27n-4e, dr 540 ft.

LINCOLN COUNTY—Amerada et al's Zimmerman 1, sw sw ne 10-12n-5e, rig. Mid-Continent & Texas Co.'s Hillman 1, sw se ne 29-13n-6e, br.

LOVE COUNTY—Sinclair Prairie's Stockton 1, se se sw 26-6s-2w, dr 7923 ft. Amerada-Stanolind Westheimer & Daube 1, sw se sw 27-6s-2e, bailing at 6200 ft.

MARSHALL COUNTY — Helmerich & Payne's Taliaferro 1, nw se sw 26-5s-5e, rig.

McCLAIN COUNTY — Arab Pet. Corp.'s Autry 1, nw nw nw 16-7n-3w, dr 8500 ft.

McCURTAIN COUNTY—Louis Sykes' Mitchell 1, cnw sw 12-9n-26e, spd & sd.

McINTOSH COUNTY—I.T.I.O. Co.'s Toncred 1, sw nw se 9-9n-14e, pb 3285 ft, pulling 8-in csg.

NOBLE COUNTY—Continental's Pruitt 1, nw se sw 19-20n-1w, pb 5115 ft, testing.

OKFUSKEE COUNTY—Champlin Ref. Co.'s Thompson 1, sw sw nw 7-13n-8e, fsg 1147 ft. Amerada-Stanolind's Wells 1, sw sw nw 7-11n-7e, dr 2890 ft.

OKLAHOMA COUNTY—Hollenbach et al's Cooper 1, nw nw ne 15-11n-1e, dr 6023 ft. Don Oil Co.'s Berlowitz 1, se sw ne 9-12n-3w, digging cellar.

OSAGE COUNTY—Elfred's Beck 1, se se ne 6-23n-7e, dr 2075 ft. Midco et al's 1, nw nw se 11-23n-6e, dr 1565 ft. Champlin Ref. Co.'s 1, sw sw ne 35-25n-6e, dr 1904 ft. Gray & Tolson's 1, sw sw ne 33-25n-7e, sd 50 ft.

PAYNE COUNTY — Amerada-Stanolind's Pratt 1, se se se 29-19n-5e, cellar.

PONTOTOC COUNTY — Sandback et al's Sands 1, ne ne ne 20-3n-5e, ru new mach. Southard & Miller's Wilson 1, nw se sw 26-4n-5e, rig.

SEMINOLE COUNTY—Imperial Drlg. Co.'s Aldridge 1, sw ne nw 32-9n-8e, td 1987 ft, pb 1900 ft, est 6M ft gas, comp. Arkansas Royalty Co.'s Kiker 1, se se ne 9-10n-7e, spd & sd. Sinclair Prairie et al's Harrison 1, ne ne nw 17-8n-8e, td 4290 ft, D & A. Tom Phillips and Kimraw Drlg. Co.'s Cheparney 1, se se nw 7-6n-7e, cellar and pits. Wilson and Reynolds Drlg. Co.'s Casey 1, sw ne ne 25-6n-7e, dr 1500 ft.

STEPHENS COUNTY—Endicott et al's McFatridge 1, nw nw sw 11-3s-9w, dr 1334 ft. McCasland's Parker 1, ne ne sw 2-1n-6w, td 43 ft, wocs.

TILLMAN COUNTY—Gulf's Wearmouth 1, se nw se 31-1s-16w, td 4530 ft, prep to dd. Johnson, Young & Mitchell's Donahoe 1, se nw nw 7-4s-17w, spd & sd. Smith's Hammill 1-A, ne nw nw 6-5s-15w, sd 1125 ft. Gulf et al's McNair 1, nw sw sw 15-3s-17w, cellar and pits.

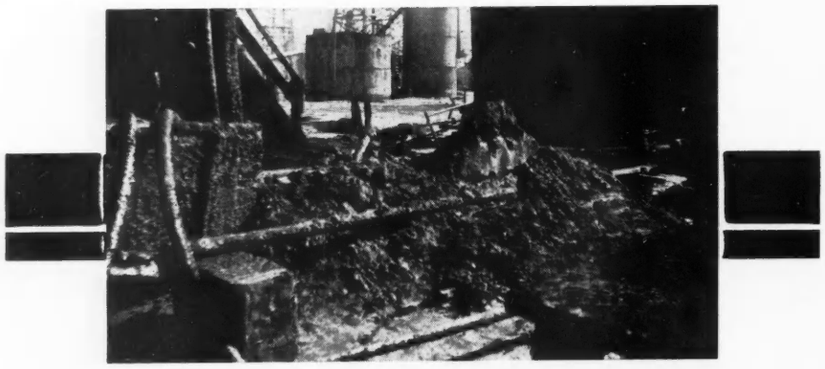
WASHITA COUNTY — McWhirter et al's Fee 1, sw sw sw 34-8n-19w, sd 1465 ft.

EAST TEXAS

ANDERSON COUNTY—Tide Water & Seaboard Oil Corp.'s J. N. Edens 15 (988.6ac), Samuel Snider sur, Cayuga field Trinity sand test, rur. Gulf's M. J. Ross 1 (54.7-ac) Robt. Erwin sur, Camp Hill area, elev 487 ft, top Georgetown lime 5452 ft, td 5476 ft, co to dd. Comer E. Todd et al's W. T. Todd 1 (100-ac), A. B. Patton sur, Boggy Creek field, sd 2392 ft.

BOWIE COUNTY—Ben J. Russell et al's O. A. Hall 1, J. W. Weaver sur, 9 mi sw New Boston, elev 316 ft, top Annona chalk 1646 ft, sd 3424 ft. Woodley & Bentley's J. D. Lumpkin 1 (245-ac), John McDermott sur, 1¼ mi sw Dalby Springs, elev 290 ft, Annona chalk 1665-2090 ft, sd 3260 ft. Westmount Oil Co et al's Phillips 1 (115-ac), W. C. Hancock sur, lcn.

CASS COUNTY—American-Liberty Oil Co.'s D. A. Maxcy 2 (86-ac), John Collum sur, elev 265 ft, Annona chalk 1989-2621 ft, top Red Beds 3450 ft, dr 5600 ft; Maxcy 3, elev 264 ft, top Annona chalk 1950 ft, top Red Beds 3485 ft, dr 4100 ft; Maxcy 4, elev 294 ft, cem sur cas; Marcus Rambo 1 (86.9-ac), J. H. Rives sur, elev 249 ft, top Red Beds 3330 ft, top anhydrite 5019 ft, massive anhydrite 5292-5530 ft, top Hill sand 5680 ft, pb fr 6073 ft to 6010 ft, est 1000 bbls oil daily on ¼-in choke. R. A. Bristol et al's B. E. Echols (16.73-ac) 1 and 2, H. Holbert sur, lcns; L. Sheppard (9.16-ac) 1 and 2, J. H. Rives sur, lot 11, lcns. Adair Heath et al's Moore Branch School 1 (2-ac), M. Reams sur, lcn. E. Key, Jr. et al's C. M. Barkett 1 (2.74-ac), John Collum sur, lcn. McElvain & Beckett's D. A. Maxcy 1, B. J. Murray sur, elev 235 ft, top Red Beds 3435 ft, dr 5770 ft. Magnolia Pet. Co. (was R. W. Norton, Tr.'s) L. A. Haywood 2 (440-ac), P. Evans sur, elev 255 ft, Annona chalk 2014-2485 ft, top Red Beds 3422 ft, dr 4880 ft; Mary Rives 2 (85-ac), John Collum sur, elev 225 ft, Annona chalk 1925-2475 ft, top Red Beds 3441 ft, top anhydrite 4990 ft, massive anhydrite 5260-5512 ft, top Hill sand 5640 ft, td 6003 ft, completed flows 555 bbls 24 hrs ½-in choke. John A. Thompson et al's S. A. Bauguss (9.11-ac) 1 and 2, J. H. Rives sur, lot 11, lcns. The Texas Co.'s E. E. Hall 1 (60-ac), Jas Young sur, elev 299 ft, top Annona chalk 2050 ft, dr 4150 ft; Hall 2, lcn. United Prod. Corp.'s Eva



CLEANED OUT

with THE CAVINS 3 Tools in One

The above well was cleaned out with the Cavins Automatic Hydraulic Suction Bailer in about one-third the time it would have taken to do the job with a spudding-type bailer. Note the amount of sand recovered. The Cavins does a better job of cleaning out, and does it faster, easier, and more economically. Write for descriptive Bulletin No. 36.

The CAVINS Company

2853 CHERRY AVENUE PHONE 414-14 LONG BEACH, CALIFORNIA

Cable Address: "Cavins, Long Beach" Foreign Representative: R. J. Elche

Bakersfield, California, 3800 Chester Avenue, Phone 1779-J. **Taft, California,** 200 Center Street, Phone 78. **Ventura, California,** Phone 4008. **Houston, Texas,** Cavins Bailer Service, P. O. Box 4174, Phone Wayside 1451. **Kilgore, Texas,** Cavins Bailer Service, P. O. Box 1325, Phone 753. **Pampa, Texas,** Cavins Clean Out System, P. O. Box 151, Phone 1220. **Oklahoma City, Okla.,** Cavins Clean-Out Service, P. O. Box 1093, Phone 3-6441. **Wichita, Kansas,** Cavins Clean-Out Service, 3226 E. Pine, Phone 45-449. **Lyons, Kansas,** c/o Carson Machine & Supply Co., Phone 227.

Fields 1 (61¾-ac), John Collum sur, elev 252 ft, top Annona chalk 1948 ft, dr 4650 ft; Fields 2, elev 268 ft, dr 3820 ft; Fields 3, elev 272 ft, lcn; F. S. Simpson 1 (160-ac), Jas Young sur, cem surface cas; L. J. Cunningham 1 (120-ac), Wm Robinson sur, lcn; J. T. Stewart 1 (49-ac), John Collum sur, elev 231 ft, dr 2650 ft; G. H. Vaughn Prod. Co.'s R. P. Willis (67-ac) 1 to 9, lcns.

CHEROKEE COUNTY — Humble's Sam D. Goodson 1 (55.42-ac), Isaac Reynolds sur, 1 mi ne Ironton, elev 428 ft, Pecan chalk 3590-4052 ft, Austin chalk 4557-4764 ft, dr 4790 ft.

COLLIN COUNTY—Port Bolivar O&R Co.'s O. G. Durning-Clarkston 1-A (140-ac), Wm. Creager sur, Pat. 1193, elev 722 ft, sd 3866 ft.

FRANKLIN COUNTY—Lucey Pet. Co. et al's A. W. Craford 1 (25-ac), O. James sur, elev 371 ft, top Pecan chalk 1593-1800 ft, top Georgetown lime 3515 ft, top Paluxy series 4121 ft, top sand 4139 ft, td 4297 ft, cem cas.

FREESTONE COUNTY — J. C. Yancey & Lovering's M. Scott 1, H. Awalt sur No. 4, 7 mi n Fairfield, sp & sd. Roger Stewart & Watson's Trinity Farm Securities Co. 1 (45-ac), R. M. Williamson sur, Cayuga area, elev 252 ft, Pecan chalk 2240-2470 ft, Austin 3175-3685 ft, dr 3980 ft.

FALLS COUNTY—J. Edward Mills et al's Sam Grucholski 1 (40-ac), Dennis Herold League, 5 mi sw Kosse, sp and sd.

GRAYSON COUNTY—Olson Drl. Co.-James H. Gardner et al's sw Life Insurance Co. 1 (160-ac), J. C. Jamison sur A-865, 3 mi n Pottsboro, elev 767 ft, top Sylvan shale 4870 ft, Viola lime 4901-5096 ft, td 5890 ft, dr by drill pipe. Port Bolivar O&R Co.'s Creed Taylor 1 (160-ac) J, Fitzhugh sur, 3 mi se Gunter, sd 3931 ft.

HENDERSON COUNTY — Wm. McDougal, Tr et al's Elvira Price 1 (216-ac), M. Mathews sur, 4 mi s Trinidad, dk. H. M. Wilson et al's fee 1 (943-ac), Thomas Caro sur, 5 mi n Malakoff, elev 359 ft, top Pecan chalk 2300 ft, sd 2800 ft.

HOUSTON COUNTY—Branch et al's P. S. Griffiths 1, Frank Johnson sur, 3 mi sw Crockett, lcn.

KAUFMAN COUNTY—J. M. Scott & J. B. Woodside's E. Robinson 1 (80-ac), A. Chirnio sur, 2 mi w Scurry, dk.

LAMAR COUNTY — Barrett, Saloman & Brooks' Haynes-McCuistion 1 (25-ac), A. W. Wright sur, 4 mi ne Garrett Bluff, Georgetown lime 275-738 ft, top Paluxy sand 739 ft, dr anhydrite 1905 ft. J. A. Forrester et al's J. S. Woodward 1 (183¼-ac), J. W. Woodward sur, 1½ mi e by s of Minter, elev 402 ft, top Georgetown lime 2256 ft, Paluxy sand with trace gas 3060-3144 ft, top anhydrite 3735 ft, base hard anhydrite 4075 ft, broken to 4105 ft, sd 4516 ft.

LIMESTONE COUNTY—C. F. Lytle et al's J. L. Thompson 1-T (141-ac), w side Mexia field, Trinity test, elev 459 ft, cem 7-in cas 6150 ft, td 6205 ft, testing. Dan H. Daugherty et al's Sallie Welch 1 (94-ac), Pedro Varella sur, 4 mi w Groesbeck, Austin chalk 2350-2650 ft, top Woodbine 2890 ft, co to dd fr 3121 ft. G. L. Rowley et al's Dean Hrs 1 (75-ac), P. Varella sur, 3½ mi sw Mexia, dry and abd 1845 ft.

MORRIS COUNTY—Raycotuck, Inc's P. M. Staggers 3 (40-ac), J. D. Nelson sur, elev 369 ft, pb fr 4139 to 1500 ft account crooked hole, Pecan chalk 2490-3135 ft, top Woodbine series 4220 ft, top Georgetown lime 4500 ft, sd 4501 ft.

NAVARRO COUNTY—Wm. A. Reiter et al's T. W. Bounds 2 (300-ac), H. Shelton sur, 1 mi sw Currie, elev 407 ft, Pecan chalk 2593-2960 ft, dr 3250 ft. E. M. Thomason & Co., Inc.'s Estes Bros. 1 (58.2-ac), Wm. Gilbert sur, 1 mi e Roane, rig.

RED RIVER COUNTY — J. S. Abercrombie Co.-Harrison Oil Co.'s Southern Pine Lumber Co. 1 (392.37-ac), D. D. Bruton sur, 12 mi ne Clarksville, elev 407 ft, dr 500 ft. Annona O&G Co.'s Leo & Otto Roberts 1 (200-ac), Jas Bankston sur, 2 mi ne Annona, elev 396 ft, Pecan chalk 40-380 ft, sd 725 ft. R. H. Manning & Texfornia Co.'s Hocker-Hughes 1 (80-ac), MEP&P Ry sur No. 642, 6 mi sw Lydia, sp and sd.

ROCKWALL COUNTY—W. H. Carlin et al's W. H. Lofland 1 (54-ac), M. B. Jones sur, ¾ mi w Rockwall, sp and sd. R. J. Sherman & Dodd's M. F. Lofland 1 (392-ac), W. H. Beard sur, 2½ mi se Rockwall, sd 750 ft.

RUSK COUNTY—McCallum et al's E. C. Gary 1 (265-ac), John Piburn sur, 5 mi s Henderson, elev 338 ft, Pecan chalk 2448-2715 ft, top Austin chalk 3224 ft, sd 3750 ft. Pure Oil Co.'s W. H. Faulkner 1 (60-ac), Wm. Elliott sur, 5 mi e Mount Enterprise, Trinity sand, or 8500-ft test, elev 563 ft, Pecan chalk 2650-2890 ft, show gas when cut through fault at 2599-2609 ft, Austin chalk 3286-3450 ft, top Georgetown lime 3446 ft, dr 5063 ft.

SMITH COUNTY—W. L. Cloud et al's Dora Kendall 1-A, John Williams sur, 3 mi e Van field, sd 1290 ft. Kelso & Thompson's McClung 1 (23½-ac), E. Newberry sur, 1 mi e Winona, elev 449 ft, Pecan chalk 3335-3660 ft, dry and abd 3780 ft.

TITUS COUNTY—Jules Alford, Tr. et al's J. E. Fry 2 (47-ac), I. P. Stern sur, rig. Humble's Myra Galt 1 (80-ac), R. I. Winn sur, A-622, elev 346 ft, Pecan chalk 1658-1785 ft, Georgetown lime 3444-4169 ft, top Paluxy series 4186 ft, td 4349 ft, completed flowed 344 bbls oil 14 hrs via open 2½-in tubing. M. B. Groves 1 (82.9-ac), Ben Jones sur, elev 309 ft, Pecan chalk 1591-1733 ft, Eagle Ford shale 2862-3240 ft, top Woodbine 3240 ft, top Red Beds 3590 ft, top Georgetown lime 3991 ft, temp abd, td 4492 ft; M. B. Groves 2 (1440 ft s No. 1), elev 352 ft, Pecan chalk 1660-1854 ft, top Georgetown lime 3680 ft, top Paluxy series 4183 ft, top Paluxy oil sand 4189 ft, td 4355 ft, completed flowed 455 bbls oil 9½ hrs via open 2½-in tubing. C. M. (Dad) Joiner et al's Huensch 1 (1416-ac), Henry P. Banks sur, 12 mi e Talco, elev 317 ft, Pecan chalk 1896-2122 ft, broken chalk at 2398 ft, top Georgetown lime 4447 ft, dry and abd in lime 4644 ft. Magnolia's C. M. Carr 1 (70-ac), M. V. Delgado sur, elev 371 ft, Pecan chalk 1634-1790 ft, top Austin chalk 3010 ft, Georgetown lime 3952-3979 ft, top Fredericksburg shale 3979 ft, cem 7-in cas 4151 ft, rust. B. C. Morrison et al's Lewis Sanders 1, blk 30, Talco townsite, elev 371 ft, dk. Nemo Oil Co.'s Talco Ind. School Dist. 1 (5-ac), I. P. Stern sur, dk. Haynes B. Owenby Drl. Co. et al's Joe Easterling 1, c lot 6, blk 16, Talco townsite, sp. Tide Water's C. M. Carr 1, M. V. Delgado sur, mim.

HARRISON COUNTY—Bridwell & Beckett's Clap 1, F. C. Baker sur, (330 ft s&e nwc s 400-ac), rur.

PANOLA COUNTY — Logansport P. L. Co.'s Rushing 1, Manning Smith sur, elev 180 ft. Base Annona chalk 1834 ft, dr 1995 ft shale.

SABINE COUNTY—Samko Oil Co.'s Bell 1, Donald McDonald sur, dr shale 1825 ft.

SHELBY COUNTY—O. T. Clak Dev. Co.'s C. H. Horton 1, J. Bowlin sur, dr 1575 ft shale. Curtin & Mulrey's C. Hayden 1, D. F. Yordt sur, mim. Potter & Rubeling's O. H. Polley Est 1, Wm. Whisner sur, arr deepen 3140 ft.

SOUTH TEXAS

ARANSAS COUNTY — Buckingham Oil Co.'s McCampbell 1, lots 8 & 9, sec 41; lots 8 & 9 sec 42, McCampbell subd, James Orick sur, 2 mi nw of Aransas Pass, 8 ft fr San Patricio county lines, sands showed on electric formation test from 5425-7120 at 6534-46, 6819-24, 6900-07, td 7501 plugged back to 6545 ft, blew out while making DST, showed 2250 lbs pres wet gas, oil from pits tested 25.5 grav, attempting to remove drill pipe, have hold of ds and prep cut and pull 1600 ft.

ATASCOSA COUNTY—R. C. Lee, Trustee (Atascosa Trust), U. A. Doumch 1, 152-ac tr, blk 10, J. T. Russell sur No. 1222, 3 miles n Poteet, td 3521, ran electric formation test, setting csg. W. B. Hinton's Weigand 1, m Donovan sur No. 124, 14 mi e Campbellton, lcn.

BASTROP COUNTY—Howell & Appleton's Herman Klemm 1, Richard Teal sur, sd 1229 ft. Marts & Beavens' Parkford & Jenkins 1, center lot 24, Bastrop Town tr, set 10-in csg at 72 ft, wocs. J. E. Mills' C. O. Randle 1, 100-ac tr, B. Brymer sur, 4 mi se Cedar Creek field, td 2266 ft, set 5-3/16-inch csg at 2228, re-acidized.

BEE COUNTY—Geo. M. Church et al's G. A. Ray 1, Anna Burk sur, 2 mi e Beeville, drlg 4050 ft. Fred Haworth Jr.'s J. E. Copeland 1, Obed Marshall sur, 3½ mi nw Pettus, dr 2340 ft. Howeth & Swiger's C. A. Voss 1, Samuel May sur, ab 230, 2½ mi sw West Tuleta field, lcn. Illinois Pet Co.'s Imogene Hall 1-C, 380-ac tr, H. W. Fontaine sur, ½ mi n Dirks field, dry and abd 3928 ft. Marine Oil Corp.'s J. C. Woods 1, 427-ac tr, J. Ryan sur discovery well, Beeville field, td 5831 ft, reinstate to re-work, new ru. Nichols & Quinn's J. R. Wcott 1, 990 ft nl, 330 ft wl, blk 7, Howeth & Swiger subd, Uranga gr, lcn. H. A. Pressey's R. T. Hicks 1, 1120-ac tr, Jose M. Uranga gr, ab 568, 4½ mi s of Normana, sd 3466 ft.

BEXAR COUNTY—American Gas Co.'s Oliver No. 5, 400-ac tr M. F. Rodriguez sur, Gas Ridge, ran 5-3/16-in csg to 3005 ft. Carter & Ingersoll's Louis Mann 1, 60-ac tr, John Christopher sur, 3 mi s Von Ormy, dr 1028 ft in Taylor, will dr to Austin chalk. Joe Deupree's Mrs. R. S. Nina (R. S. Coffey) 1-A, Rodriguez sur, 7 mi s San Antonio, td 1200 ft, testing. S. G. Winter 1, 100-ac tr in Fernando Rodriguez sur, one mi w of Russell 1, sd 1425 ft. Nick Morosis' T. O. de Ruiz 1, F. Rolen League and Labor sur No. 48, just s of Von Ormy, dr 457 ft. H. J. Moore's Mrs. Lena Eisenhauer 1, 80-ac tr in Gertrude Rodriguez sur, 9 mi ne of San Antonio, dr 813 ft in basal Taylor. O. M. Owensby's Minna Coreth 1, 284-ac tr, Adam Stafford sur No. 49, e Eckert field, still sd 1091 ft. W. H. Schaeffer Co.'s A. Mihaliski 2, 98-ac tr, J. M. Bustillos sur, 1 mi n St. Hedwig, sd 850 ft in shale. H. B. Schumacher's Hilda Gillette 1, 49-ac tr, M. G. de Alamiz sur No. 20, 7 mi s San Antonio, s.d. 708 ft repairing pump. F. M. Shaver's A. W. Bitter 2, Jose Baerrera sur No. 58, 2 mi nw Von Ormy, dr 745 ft, will dr to chalk, Fred Thorman's A. L. Salm 1, 330-ac tr, Hays sur No. 3, 2 mi s Martinez 1 coring 682 ft. R. P. Whitfield et

talk about
SIMPLICITY

This is the low pressure SHEAR-RELIEF Valve, for gathering pumps, or similar service.

No One Can Misunderstand Setting Directions Like These!

All necessary details of operation of the Abercrombie SHEAR-RELIEF Valve are right on the name-plate, so you can't go wrong in setting it. Notice the relieving pressures, and the size nail which shears at each pressure. Notice also the nail gauge, which eliminates any chance of mistaking nail size. Notice, too, the simplicity of inserting the nail on the SHEAR-RELIEF Valve, shown at the left.

FLUID-PISTON SLUSH PUMPS
ABERCROMBIE PUMP CO.
GULF BLDG. HOUSTON TEX.

William M. Barret, Inc.
Consulting Geophysicists
Specializing in Magnetic Surveys
Contracts accepted for domestic and foreign projects, using the most improved instrumental and interpretative technique.
GIDDENS-LANE BUILDING
SHREVEPORT, LOUISIANA

AMERICAN SEISMOGRAPH COMPANY
Geophysical Surveys
Houston Los Angeles
Oklahoma City

HOARD EXPLORATION COMPANY
Seismograph Surveys
623 Esperson Bldg.
Houston Texas

GEOPHYSICAL REPORTS
National Exploration Company — Seismic Surveys
Robert P. Clark Co. — Torsion Balance Surveys
SHELL BUILDING, HOUSTON, TEXAS

NORMAN RICKER, Ph.D.
Consulting Mathematical Physicist
MATHEMATICAL ANALYSES OF PROBLEMS in ENGINEERING AND APPLIED GEOPHYSICS
P. O. Box 1919 Phone Hadley 8510
HOUSTON, TEXAS

DAVID DONOGHUE
Consulting Geologist
Appraisals » Proration « Statistics
Fort Worth National Bank Building
FORT WORTH, TEXAS

PATENTS
Patents, Trade Marks, Copyrights and Infringement Litigation
HARDWAY & CATHEY
428-29-30 Bankers Mortgage Bldg.
Phone Fairfax 8232 Houston, Texas

JACK A. SCHLEY
Patent Attorney
(Established 1902)
PATENTS—INFRINGEMENTS—OPINIONS
1807-11 TOWER PETROLEUM BLDG.—DALLAS
805 2ND. NATIONAL BANK BLDG.—HOUSTON
San Antonio — Washington, D. C.

THE FORT WORTH LABORATORIES
Field Gas Testing. Analysis of oil field brines, gas, minerals and oil. Sell Thermometers, Hydrometers and Laboratory Glassware.
F. B. Porter, B.S., Ch. E., Pres.
R. H. Fash, B.S., Vice-President
828½ Monroe St., Ft. Worth, Tex.

al's Col. John Sweeny, 340-ac tr, GH&SA RR sur, 11 mi sw San Antonio, sp.

BROOKS COUNTY—The California Co.'s B. Garcia 1, tr No. 3 Las Mestinas de Gonalina gr, Alta Mesa dist, coring 6300 ft. Nordan & Morris & Jim Nash's Wm. Singer 1, sec 312, Alta Verde, dr 622 ft. Pedernal Oil Co.'s Wm. Singer 1, nw¼ sw¼ sec 436, Alta Verde, testing abt 920 ft.

CALDWELL COUNTY—J. J. Elam et al's Francis-Brown-Cochran 1, W. F. Young sur 5 mi e Luling, sd 27 ft to lay new water line. W. C. Jennings & Whittington's McMahan 1, James Pinchback sur, se Lockhart, 5-3/16 csg at 1995 ft, acidized with 2000 gals, td 2343, washing in, showing some oil. W. W. Lincoln's W. Branyon 2, 20-ac tr, Dillard Cooper sur, Branyon, td 1830 in Taylor, show oil on ditch. Odgen & Reed's Mamie Barber et al 1, 65-ac lse, Squire Damon sur, 5 mi nw of Dale, sd 2004 ft; Mamie Barber et al 2, 65-ac lse, Squire Damon sur, comp 50 bbls day on pump td 2164.

CALHOUN COUNTY — Continental Oil Co.'s Vandenberg 1, sec 12, blk "H" Pedro Garcia sur, 1 mi n of other heaving shale wells, Seadrift prospect, spudding. Humble O&R Co. & Plymouth Oil Co.'s P. H. Welder 2, 1937-6-ac tr, J. M. Rios sur, 2 mi n Heyser, sand 5452-58 ft, cap 5458-59 ft, sand 5459-66 ft, dst 5446-66 ft show 350 lbs 120 ft oil, mud and dr fluid 10 min, ream and dst 5459-66 ft show 240 ft oil, oily mud and dr fluid 15 min, cored ahead to 5474, dst 5458-74, rec 125 lbs pressure, 15 min abt 2000 ft fluid when first joint was broken off test sprayed oil for 5 min in last 6 thribles was 400 ft 32.8 grav and 150 ft mud, sand, oil and fresh water. Hilton & Miese's J. Brundrett 1, in Wm. Little sur, reinstated, sd 192 ft, to move in materials.

DEWITT COUNTY — Southwestern Dev Synd Ltd's W. L. C. Poetter 1, 590-ac tr in Obed Marshall sur, 1320 ft w Slick field discovery well, lcn. Universal & Gillespie's Schubel 1, C. Fitzgerald sur, abt 2 mi nw Yoakum 1370 ft, faint oil show.

DUVAL COUNTY—Atlantic Oil Prod. Co. & Darby Pet Co.'s J. F. Welder 1-F, sec 552, 1 mi w discovery well Loma Vista field, coring 2276 ft. G. E. Glasscock's Milano Land & Garden Co. 1, sur 87, 6 mi se of Gov't Wells, coring 3094 ft. Frank J. Gravis et al's Gravis et al 1, sec 250, 9 mi w San Diego, coring 5040 ft, hard sand. Kepley Prod Co.'s C. D. Sevier 1, sur 71, Santa Rosalia gr, 7 mi nw Driscoll field, td 3410, set 5½-in csg 3233 ft, perf 3165-71 with 10 shots, swabbing. Magnolia Pet Corp.'s Ira G. Yates 1, sur 556, 7 mi se Seven Sisters, dry and abnd 3949 ft. Marzo Oil Co.'s E. R. Hagist 3, sec 269, 1 mi ne Eagle Hill, dr 1820 ft. M. D. Mastin's D. Ruiz 1, sur 128, 1 mi w Hoffman field, sd 60 ft. Rio Bravo Dr Co. et al's W. R. Peters 1, 160-ac lse, sec 397, J. H. Gibson sur, 2 mi e Kohler field, dr 1630 ft. Santa Clara Oil Co.'s R. Serna Jr, 1, sw¼ sec 521, three mi e Loma Vista, dr 1323 ft. Shell Pet Co.'s J. F. Welder heirs 1, 80-ac lse, sec 103, s offset Alta Vista discovery well, fsh 2345 ft. Smith & Hamill's M. C. Hubbard 1, sur 69 one mi s of Loma Novia field, coring 2752 ft. Stanolind O&G Co.'s Ira G. Yates 4, sec 560, ½ mi s discovery well, Labbe field, spudding. J. T. Stover's W. J. Hester 1, nw¼ sec 47, west outpost Gov't wells, dr 825 ft.

EDWARDS COUNTY — Paul Teas' J. B. Stewart 1, sec 2, GC&SF sur, 14 mi se Rock Springs, dry and abnd at 5270 in black shale.

FAYETTE COUNTY — Ben G. Barnett's Sandy McKinnon 100-ac tr, Adam Zumwalt League, 10 mi nw Flatonia, co 3140 ft to re-dr.

W. P. JENNY
Consulting
Geologist and Geophysicist
2102 Bissonnet Houston, Texas

Sales Engineer Desires Connection
A sales engineer who has a wide circle of acquaintance with the trade and who has been successful in connections with manufacturing companies in selling refinery, gasoline plant, and pipe line equipment, desires to make a new connection. Service in southwest preferred. Address, Sales Engineer, care The Oil Weekly, Box 2811, Houston, Texas.

WANTED: Responsible drilling contractor to drill several 1200 foot wells in proven territory. Cash payment upon satisfactory completion. State type of rig. Write Box 1652, care The Oil Weekly, Houston, Texas.

FRIO COUNTY—Amerada Pet. Corp.'s T. G. McWilliams et al 1 (tr 17) J. M. Tiferina sur 300, Pearsall, top Austin chalk 5439 casing 5442, td 5676, comp 108 bbls oil in 9½ hrs, ½ ch, ran 2½-in tubing 5514; Halff & Oppenheimer 7, B. J. Gilman sur Pearsall, td 3926 pb to 3912, woc and wo standard tools; W. H. Smith 2, 1476-ac tr and J. V. Mason sur No. 322, Pearsall, dr 3862 ft. T. Davis et al's Halff & Oppenheimer 1, J. D. Clara sur No. 336, 1 mi ne Pearsall deep production, sd 5433 ft, top chalk 5330, csg 5337. Midland Oil Co.'s San Antonio Joint Stock & Land Bank 1, 60.8-ac tr, J. C. Woodward sur No. 2, 1 mi s of Pearsall, townsite, to deepen from 4069 ft. Termo Co. of Texas' A. L. Arp 1, 102-ac tr, Blarissur 4000 ft w Pearsall prod, dr 1800 ft.

GOLIAD COUNTY—Cotton Belt O&G Co.'s M. Lutenbacher 1, blk 25, Goliad Townsite sur, south of Goliad, sd 5545 ft, hard cap 5530-44; soft sand 5544-45, bridged 3205, ds stuck, abnd and dr new well.

GONZALES COUNTY—O. M. Owensby et al's H. B. Steen 1, N. M. Bane sur, sd 2135 ft. Tull et al's Boska 1, 61.2-ac tr, B. McClure sur, sd 1956 ft.

GUADALUPE COUNTY—Paul Armstrong's Clem Brodnaux 1, 36-ac tr, W. P. King sur, 2 mi ne Kingsbury, dry and abnd 2426 ft, lime J. E. Clark's E. W. Williams 1, Green DeWitt sur No. 13, 4000 ft sw S Darst Creek, top Austin chalk 2358 ft, dr 2392 in chalk. Clark & Weinert's Anderson 1, Green DeWitt sur No. 11, 6 mi s Kingsbury, dr 2012 ft, sandy shale. Louis Crouch's J. Getzke 1, J. D. Clements sur, Zoboroski, td 2300 ft in chalk, flowing by small heads, 50 bbls day; Frank Zoboroski 1, 70-ac tr, J. D. Clements sur, Zoboroski, td 2722 ft, made 3000 bbls sul-water from Edwards lime, pb to 2210 ft in chalk, woc. Eickenroht & Gallagher's O. H. Jahns 1, 840-ac tr, Green DeWitt sur, 3 mi sw S Darst Creek, dr 2915 ft, top Austin chalk. A. D. Locke's J. S. Slaughter 1, 105.3-ac tr, Cyrus Campbell sur, 1 mi nw Staples, sd 1050 ft. W. J. Walton et al's W. F. Krueger 1, H. Branch sur, just n Zoboroski area, dr 2009 ft in shale.

HIDALGO COUNTY—Dean Brothers' Mrs. Lula George 1, tr 13, porc 41, Reynosa Juris, 700 ft north of Samfordyce prod, td 2754 ft, 7-in csg 2751 ft, comp 50 bbls day, 3/32 ch. Gerald O&G Co.'s Nelson Mortgage Co. 1, blk 38, lot A, La Blanco Agricultural sub, 4 mi s city of Donna, dr 4100 ft. Gulf States Oil Co.'s J. C. Engelman 3, lot 3, blk 70, Las Mestenas gr, 700 ft e of Mestenas field disc well, gas sand 6365-73 ft, sand with light show of oil 6706-29, with oil show 6743-60, set 7-in csg 6764 after running Schlumberger. King-Woods Oil Co.'s Osca Daskam 2, blk 30, porc 45, Reynosa Juris, 10 mi w of Mission, lcn temp abnd. Maxwell-Mundy-Morris' Southland Dev. Co. (Hidalgo County Water Control & Impr Dist) 2, lot 11, blk 20, Alamo Lnd & Sugar Co. Sub, Alamo gr, 4 mi s Alamo, td 725 ft, pref csg 650-56 ft, bailing, slight oil show. Quintana Pet. Corp.'s John C. Engelman 1, lot 10, blk 94, La Mestenas gr, 4 mi se Mestenas field, coring 8676 ft. Dayle L. Smith Oil Co.'s Fairbanks & Young 1, blk 44, porc 46, Reynosa Juris, 4 mi e Samfordyce field, dr 1862 ft. Union Sulphur Co.'s ARGL & I 7, tr No. 2309, blk 59, 4000 ft e Mercedes field, td 7608, 5-in csg 7530, swabbing through perfs 7540-49 ft; ARGL & I Co. 8, lot 2120, blk No. 87, N. Capisallo Dist, n Mercedes field, coring 7816 ft; ARGL & I Co. 9, Farm tr 2268, blk 59, N. Capisallo Dist, ½ mi e Mercedes disc well, dr 6587 ft. Yates McCurry's Southland Dev Co.'s 1, lot 13, blk 24, Alamo sub, 2½ mi s of Alamo, sp and sd.

JACKSON COUNTY—Shell Pet Co.'s C. F. Combs 2, sec 33, M&C sur, 1175 ft se disc well Bauritz field, dry and abnd 5852 ft.

JIM HOGG COUNTY—French Oil Corp.'s J. Vela Pena & Bros, (E. Rodriguez) 2, lots 18 and 19, sur 579, 5 mi nw Randado, dr 1820 ft. Encde et al's J. C. Saunders 1, corners of blks 18, 19, 30 and 31, sec 17, R. Holbeing sub, sh 3, Las Animas gr, r.u. S. L. Miller Oil Co.'s Yeager 2, blk 6, sur 30 dr 3240 ft.

JIM WELLS COUNTY—Gist & Graddy's B. W. Owens 1, nw Bentonville field, Poitevent sur, sp and sd. R. A. Graddy's F. Bennett 1, lot 87, sec 76, Holdeman sub, 2 mi w Premont field, lcn. Houston Oil Co. et al's E. A. Hawkins et al 2, blk 11, Putnam sub, sh 3, San Diego gr, ½ mi San Diego field, otd 6301, pb 3500 ft, sd/tr, dr to 6480 ft, unable to get electric formation test to bottom of hole on account of caving around 4500 ft, csg was set on the 2955 ft gas sand, tested sw at 2960 ft, may abnd. Stanolind O&G Co.'s E. W. Raney 1, ne¼ sec 16, King Ranch sub, w offset disc well Bentonville field, bldg dk; J. E. Saim 1, sw¼ sec 18, King Ranch sub, n offset disc well Bentonville field, bldg dk. Texon Royalty & Lucey Pet.'s Co. Leona Dodd 1, sec 15, King Farm lots, nw offset disc well Bentonville, dr 1900 ft. Joe E. Walsh's W. D. Wade 2, lot 2, blk "C" Bode sub, Sandia area, sd 1200 ft.

KARNES COUNTY — DeGraffe & Reele's Cochran 1, McConnell League, 5 mi ne Riddleville, ru and sd. Hickman et al, R. L. Barnett 1, beginning at the s/cor of Alex Hunter sur, thence ne along sur line 6900 ft, then nw at rt/a 1300 ft, mim. Worth Oil Co.'s E. Hysaw 1,

1069.8-ac tr, Don Erasmus Seguin gr, w of Kenedy, lcn.

KERR COUNTY—Auld & Evans' I. R. Heffner 1, sec 13 BS&F sur, 25 mi nw Kerrville, set 10-in csg 1486 underreaming 1565 ft. Eastland Oil Co.'s Jeff Love 7, Martinez sur, sec 1594, Love Ranch area, td 2432 ft, set 6-in csg 2346, hole full of water. Evans & Edminston's Will Auld 1, sec 1592, 418-ac tr, sp and sd.

KIMBLE COUNTY — Dr. B. R. Thomas' Rust 1, sw¼ sec 47, BS&F sur, 13 mi nw Junction, lcn.

KLEBERG COUNTY—McCord & Daybault's Killam 1, lot 7, sec 53, DT&I sub, 5 mi se Recardo, lcn.

LASALLE COUNTY—Davenport & Talbot's G. Watkins, sur 103, 25 mi e Encinal, sd 2830 ft. Paul Meaders & Adair et al's Reed 1, sec 136, T. Conlan sub, 15 mi e and 10 mi s of Cotulla, fsh for ds 2792 ft.

LAVACA COUNTY—J. D. Aguier et al's No. 1, A. A. Staffa, W. R. Hensey sur, 5 mi s Schulenburg, sd 2738 ft. Goods & Mayton's M. Schaeffer et al 1, 481-ac lse, W. R. Hensley sur, lcn.

LIVE OAK COUNTY — Dirks Bros.' A. Troell 1, 80-ac lse, Leal sur, 5½ mi ne Geo West, coring 3605 ft for Pettus. R. H. Feltner et al's John T. Carter & Bros 1, sec 319, T&T Ry Co. sur, sw portion of county, td 3466 ft, went into old hole at 2985 ft, now setting new whipstock. Inter-Allied Pet Corp.'s Aetna Life Inc. Co. 1, J. Poitevent sur, 49.47-ac tr, 6 mi ne Dinero, dk, wo rig. Odgen & Reed's D. C. Reed 1, Clegg Ranch, sw part of county, dk. T. T. Quinn's E. Terrell 1, J. Houlihan sur, 1½ mi ne Whitsett, sd 1080 ft, for orders. Windsor Oil Co.'s B. E. Stolte 1, center tr 9, J. Ingram sur, ab 261, bldg dk.

MAVERICK COUNTY—Thomson & Streeter's Joseph Wipff 1, sec 18, 7 mi w Chittim field, 10 mi n Eagle Pass, sd 220 ft.

McMULLEN COUNTY—Aransas Oil Co.'s Ruckman 2, sur 69, 13 mi sw Wentz, sd 900 ft. John F. Camp Dr Co.'s C. E. Byrne Est 3, 206-ac Byrne tr, Geo Pittuck sur, w of Calliham, td 500 ft, killed and prep to dr ahead.

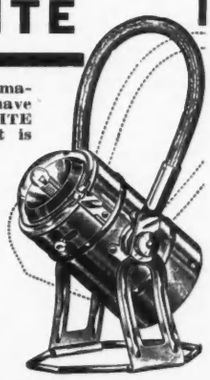
SOUTH TEXAS GEOPHYSICAL CORP.

Seismograph Exploration

Phones
Fairfax 3321 ; Long Distance 49

20TH FLOOR STERLING BUILDING HOUSTON, TEXAS

90 PER CENT PREFER ECOLITE



Yes, sir—90% of all major oil companies have standardized on ECOLITE Electric Lanterns. It is supreme in the oil business because it is safe, dependable, never fails and is easy to use. Ecolite 44 U.S.V. is approved by Underwriters' Laboratories. Available at Supply Stores.

ECONOMY ELECTRIC LANTERN CO., INC.
325 W. Huron St., Chicago, Ill.

ECOLITE
IT PIVOTS—TILTS—FOCUSES

Climax Oil Co.'s H. I. Lark 1, blk 96, E. W. B. Schrugham sur, ne Calliham field, lcn. Dan Culver & G. C. Richardson's Wm. Fehler 1, G. Pittuck sur, w Calliham, lcn. Daybault's Matula 1, 100-ac James Garner sur, 2½ mi sw Calliham, sd 1018 ft. Charles A. Hall No. 2 Claunch, 200-ac tr, M. Hely sur, ½ mi s Calliham sd 967 ft. R. J. Hill et al's Richardson 1, sur 158, 15 mi sw Tilden, sd 595 ft, corrected depth. Humble O&R Co.'s Rhodes 1, 330 ft out of sw/cor of sec 17, lcn. Reliance O&R Co. & Santa Clara Oil Co.'s Shiner Est 1, nw¼ w½ sec 80, Shumway sub, r.u. V. G. Schimmel's E. R. Hagist 1, sw¼ sec 108, ½ mi s Loma Alta field, dr 1910 ft. Whisenant & Trenchard's Roos Bros 1-A ne¼ sec 60, 1¼ mi sw Magnolia Kincaid 2, lcn.

MEDINA COUNTY — Frank A. Brown's Mary Winn 1, John Ward sur, td 60 ft, set sur csg and sd. R. S. Bynum's Melton 1, 160-ac tr sur 14½, lcn. W. C. Campbell et al (Ed Falvey et al's) McMenemey 1, sur No. 331, G. Pettu sur, 4 mi se Devine sd 2892 ft. Gates & Holls' W. B. Odom 1, 300-ac tr, H. Castro sur No. 174, 5 mi sw of Hondo dry and abnd 329 ft, hard broken shale 292-311, limey shale 311-29. N. C. Johnson's Taylor 1, 320-ac tr sur 136, lcn.

NUECES COUNTY—V. L. Blanchard's T. H. Isensee 1, blk 8, R. Shaeffer lands sub, 1½ mi w Clarkwood townsite dk. J. T. Cox's John Harvey, share 11, Harney lands, Gregoria Farias gr, 2½ mi se Callahan, sd 50 ft. Tom Graham & Republic Nat Gas Co. & Whelan 1, 40-ac lse, Willareal sur, Saxet Hgts, td 5254 ft, testing through perforations 4058-60 ft. M. F. Hurlburt's J. C. Phillip 1, center lot 9, 20-ac tr, sur 48, Flour Bluff Encinal Garden Tracts, 9½ mi se Corpus, coring 4445 ft. W. P. Hinds Edwin Flato 1, center blk 8, sec 107, 1½ mi sw Clara Driscoll field, sp. O. W. Killam's Betty Ellich 1, 86.28-ac tr, sec 109, Pauls sub, 4000 ft sw Clara Driscoll field, running electric formation test 3817, cap 3811-13, sand 3811-17 ft, td 3822 ft in shale, 7-in csg set on bottom, wocs. La Jita Corp.'s Richard King Est 2, sec 24, King Ranch sub, one mi sw King Ranch gassers, 2 mi ne Bentonville discovery, coring 5725 ft in hard, blue sticky shale. Morgan Gulf Oil Co.'s Rand Morgan 2-A, sec 403, Saxet, 2000 ft sw 5800-ft prod, sand 5836-44 ft, 7-in csg 5836 ft, comp 13 bbls 3/16 ch, cp 1000 lbs, tp 850 lbs. H. M. Reed's Katherine Quinn 1, 19.6-ac tr, Villareal sur, abt 3300 ft w of Saxet Hgts prod, td 4117, set csg on bottom, ran electric formation test. G. M. Richardson's Wm. Gerhardt 1, 208.65-ac tr, sec 79, Geo. H. Pauls sub, A. F. de La Fuente sur, abt 2½ mi ne Agua Dulce field, dk. Southern Minerals Corp.'s Mrs. M. P. Masten 1, 124.32-ac tr, G. Frank sur No. 416, Saxet 1000 ft n 5800-ft prod, sand 5803-5824, dst show 2000 ft plo, 260 lbs pressure, set 7-in csg 5814 ft, dr plugs; Rand Morgan 2, lot 42, Artemus Roberts sub. AB&M sur, sec 411, Saxet, 9200 ft nw 5800 ft prod, ru. Terminal Oil Products Co.'s R. V. Thurman 1, sw¼ sec 10, Flour Bluff Garden Tracts, Rincon del Oso Grant, mir.

SAN PATRICIO COUNTY — Benedum & Trees' Mrs. E. H. Welder 2, sec 19, Welder Ranch sub, 3¼ mi ne Sinton, td 6116 ft pb 6100 ft, wocs; C. V. Jones 1, sec 65, Geo. H. Pauls sub, Coleman-Fulton Pasture Co. Lands, 3 mi e White Point field, 4½ mi nw Portland, reaming 6113 ft. C. B. Bunte's W. C. Mayfield 1, tr 11, Roos sub, 2 mi n White Point field, ru. Esnes Oil Co.'s (Geo. E. Smith) J. E. Britton 3160-ac tr, sec 6, blks 7 and 8, 2nd sub Taft Lands, Taft, dr 3200 ft. Joe Lunden & Rowan & Hope's Mrs. E. H. Welder 1, 330 ft nl and wl of sw¼ of sec 20, Welder Ranch sub, 2½ mi sw St. Paul, lcn. Portillo Oil Co.'s E. H. Welder 1, sec 37 Welder Ranch sub, one mi sw of Plymouth field, dry and abnd 6010 ft. Shell Pet Corp.'s G. W. Pullin 1, sec 1, second addition Taft Farm Lands, Taft, td 4920 ft, prep rerun screen after cutting 5 more ft of oil sand. Willis Storm's Nancy Hobbs 1-A, 50-ac tr, M. P. J. & N. Delgado sur, sd 7004 ft, heaving shale, abnd, ran electric formation test to 6640 ft. Texon Dr Co.'s R. L. Rambo 1, sec 35 fourth addition of Taft Farm Lands, 1/3 mi e of s end of field, td 5654, now under control and capped, flowed considerable oil through bleeder valve in manifold used to cap it, will set screen and run tubing under pressure.

STARR COUNTY — J. F. Anderson's Yzaguirre 1, 139-ac tr porc 79, dr 710 ft. Coreta Pet Co.'s N. Pena 1, share 80, porc 80, Camargo Juris, 1½ mi n Rio Grande City field, dry and abnd 1500 ft. J. J. Currie's Y. G. Garcia 1, sh 7-B, porc 71, 16 mi nw Rio Grande City field, dr 770 ft. Porter Evans' SCCC 1, beginning at State Highway No. 4 where it crosses the wl porc 89, thence s along wl porc 89, 13,000 ft thence e at rt/a 500 ft to lcn, lcn. Killam & Staggs' S. D. Ricaby 1, 150 ft s Highway 4, porc 83, Carmargo Juris, 3 mi e Rio Grande City field, coring 1320 ft. Larkins & Warr's Kelsey Bass 1, lot 8, Coastal sub, porc 87, Barbacoas area, sp. Ed Leach's Wood Est 1, 2100 ft n Rio Grande, porc 84, 3 mi se Rio Grande City, sd 2500 ft. St. Marys O&G Co.'s O'Shea (Gonzales) 1, 450 ft nl, 850 ft wl sh 65, porc 71, n of Roma sd 575 ft. Otto W.

MAKE MONEY
. . . . . Equip Your Wells with

O'BANNON PUMPS

Cold drawn Rod Type with Alloy Iron Plunger

— Run Longer

•

Lighten Rod Loads

•

Lessen Rod Breakage

For Deep Wells
For Sandy Wells
and Difficult
Pumping
Conditions

Sold by Supply Stores

MANUFACTURED BY
WALTER O'BANNON CO.
TULSA, OKLA.

Woods H. P. Guerra 1, lot 35, Conroe sub, porc 50 Mier Jirs, dr 140 ft.

TRAVIS COUNTY—Albrecht & Brinkrueger Sr.'s M. C. Swenson 1, 75-ac tr, L. Kimbro League, sec 5, Kimbro area, dry and abnd 1280 ft. Artz & Co.'s Wolff 1, Thomas Hancock sur No. 20 ½ mi n New Sweden, dry and abnd 1280 ft. W. F. Johnson's Eliha Berry 1, center lot 1, lot 14, Granview sub, division B, city of Austin, lcn. Sal-Mar Oil Corp.'s P. Carlson 1, M. W. Smith sur, 4 mi n Kimbro, lcn.

VICTORIA COUNTY—Rowan & Hope's A. W. Scheel 1, 195-ac tr, J. E. Escalera gr, S. Nursery, dry and abnd 6026 ft.

WEBB COUNTY — French Oil Corp.'s S. Benavides 1, sec 2254, 3 mi n Oilton, lcn. Illinois Pet. Co.'s J. H. Kirkpatrick 1, 330 ft out of se/cor of nw¼ of sec 16, CCSD&RGNG RR sur, nw of Lopez field, lcn. W. H. Vernor's Tr's Jefferies Ranch 1, blk 13, sec 1454, 30 mi nw Laredo, sd 1435 ft.

WILLACY COUNTY—Shell Pet. Co.'s Yturria Land & Cattle Co. 1, most southerly se/cor of sh 64, San Juan de Carritos gr, La Sal Veja prospect, dr 4565 ft.

WILLIAMSON COUNTY — H. F. Goff's Charles Patschke 1, 100-ac tr in Foley sur, 2 mi se of Thorndale, sd 1135 ft. James H. Holdeman et al's Amor Forwood 1, 160-ac tr, H. T. & B. Ry sur, sec 4, sur 14, no rept.

WILSON COUNTY—Otto Hierholzer's E. M. Hierholzer 1, R. Salinas sur, 12 mi sw Floresville, lcn. A. G. Reimenschneider's Lon Harrell 2, 209-ac tr Manuel Baerrera sur, 5 mi s of Floresville, dr 655 ft.

ZAPATA COUNTY—Dan Auld & Oklahoma Co. of Texas' J. M. Sanchez 1, blk 37, sur 9, Borrego gr, n end of county, sd 2110 ft. Ivan Howard et al's Y. Martinez 2, blk 1, sur 241, ru. George Buck's Haynes 1, 200 ft sel, 1520 ft swl, blk 4, A. D. Haynes sub, Comitas & Villa gr, ru. R. A. Mitchell's P. Bustamente 1, share 32, Fansler Partition, Comitas Grant, Escobas area, ru. J. J. Perren's Uribe 1, blk 31, Perren sub, sd 485, San Ygnacio sub, Borrego gr, 12 mi ne San Ygancio, prep to sp.

ZAVALLA COUNTY—Bay Oil Corp.'s Nat'l Bank of Commerce 1, sec 43, blk "A", AB&M sur, 16 mi se Batesville, coring 3982. W. L. Bridges' E. B. Flowers 1, sec 19, blk 1, I&GN RR sur, sd 450 ft. Frank Buttram et al's Whitecotton 1, B. & M sur No. 1, dr 4210 ft. Leona Oil Corp.'s George West 1, C. Bustillo sur No. 1 dr 5543 hard sand.

TEXAS GULF COAST

BRAZORIA COUNTY — Gulf's Fairfield 1, Lockridge prospect, A. Robeson sur, to sdtr at 8398 ft. Texas Gulf Prod. Co.'s Sparks 1, Angleton prospect, Wm. Roberts sur, dr salt water sand 6237 ft. Strake Pet. Corp.'s Poole 1, Poole Ranch prospect, W. Eggers sur, fsh 3700 ft.

CHAMBERS COUNTY—Glenn H. McCarthy's A. Pitt 1, Winnie prospect, J. M. Duran sur, dr sand 7480 ft. Salt Dome Oil Corp. & Gem Oil Co.'s A. B. & V. Lawrence 2, Cotton Lake prospect, S. Barrow sur, abn 7300 ft.

GALVESTON COUNTY — Coastal Minerals Dev. Co.'s M. J. Joslin 1, Friendswood prospect, S. McKissick sur, abn 6506 ft. Sun's J. E. Hughes 1, Green Lake prospect, W. C. M. Baker sur, dr shale 9318 ft.

GRIMES COUNTY—Crooke Bros. et al's W. W. & J. E. Greer 1, near Carlos, P. B. Connor sur, sd 2492.

HARDIN COUNTY — David B. MacDaniel's Nona Mills 1, Grisby prospect, E. Emanuel sur, dr shale 6907 ft. Resource Prod. Co.'s C. W. Howeth 1, sw of Arriola, A. J. Cotton sur, sd 4357 ft. Republic Prod. Co.'s Burrell 2, Silsbee prospect, A. A. Burrell sur, mim.

HARRIS COUNTY— Amerada-Stanolind's L. Dopsalus 1, Fairbanks-Satsuma prospect, W. C. R.R. sur, blk 1, sec 2, dr shale 6585 ft. Bunte et al's Lobit 1, Cedar Bayou prospect, B. Barrow sur, dk.

JEFFERSON COUNTY—Magnolia's Funchees 1, Cheek prospect, H.&T.B. sur, No. 16, dr shale 7860 ft. Sun's Hebert Broussard 1, Labelle prospect, B. Blackmon sur, dr shale 8187 ft. C. W. McPhil's Owens 1, n of Port Arthur, dr shale 2098 ft.

LIBERTY COUNTY—Atlantic & Brace's E. E. Hardy 1, Hardin area, J. Robeson sur, perforating csg 7700 to 7710 ft.

MATAGORDA COUNTY—Helmerick & Payne's Hawkins 1, Sheppards Mott area, D. A. McCarthy sur, dr shale 3370 ft. Sun's Craig 1, e flank of Hawkinsville dome, T. Williams sur, dr heaving shale 6741 ft.

MONTGOMERY COUNTY — Mid-Texas Oil Co.'s Security Trust Co. 1, Willis prospect, G. W. Lewis sur, abn 4547 ft. H. W. Blumenthal's Delta Land Co. 1, Dacus area, J. Beuhn sur, woc 54 ft. Chapman & Smith's Delta Land Co. 2, Dacus area, T. Sheppard sur, abn 5123 ft. Tide Water's Gorbitt 1, Splendora, J. J. Blackman sur, dr sand and shale 3707 ft.

POLK COUNTY—Dick Schwab's Kirby Lbr. Co. 1-A, Ace area, T. A. Sublett sur, dr shale 573 ft.

SAN JACINTO COUNTY—C. Gholson & L. Decker's Randolph 1, Evergreen area, V. Flores sur, dk.

WALKER COUNTY—Boone Brothers et al's Thompson Bros. Lbr. Co. 1, w of Trinity, J. Ortego sur, mim.

WASHINGTON COUNTY—Sun's Lauter 1, Clay Creek, se flank, N. Clay sur, dr shale and lime 4452 ft.

WHARTON COUNTY—Pure's E. Paige 1, Blue Basin prospect, J. Pirie sur, cutting and pulling 8393 ft. A. C. Roan's E. Oswald 1, Leach prospect, E. T. R.R. sur, sec 61, lcn. Sterling's A. Genzer 1, East Bernard prospect, J. Scott sur, dr shale 4100 ft.

WYOMING

ALBANY COUNTY — James Lake Oil Co. George & Hunt 1, nw ne se 5-17n-75w, bldg derrick.

BIG HORN COUNTY—J. H. Shaffer Keachie 1, sw sw sw 8-49n-91w, plugging and abnd at 1315 ft. J. W. Bales Parker 1, csw sw 23-49n-89w, dr 675 ft.

CARBON COUNTY—General Petroleum Corporation Union Pacific 1, sw sw nw 5-19s-83w, set surface pipe at 4920 ft, and dr at 1310 ft. ne 31-35n-62w, waiting on cement to set around

CONVERSE COUNTY—E. B. Jones State 1, sw sw sw 16-32n-69w, dr 1939 ft.

NIOBRARA COUNTY—Lewis Gokel 1, sw 10-in csg at 300 ft. S. & H. Development Co. Olinger 2, cnl sw ne 1-35n-63w, re-running 4¼-in csg 1682 ft.

SHERIDAN COUNTY — Sheridan Syndicate Allison 1-A, sw sw se 15-5n-85w, still fsg at 3650 ft.

WASHAKIE COUNTY—Wyoming Oil & Refining Co. Frison 1, nw sw nw 14-48n-91w, dr 1695 ft and may plug back to 1400 ft to straighten crooked hole.

WESTON COUNTY—Conway Oil Co. Government 1, se se nw 7-4n-60w, preparing to cement the 3½-in tube to shut off water and test oil show encountered in the Pahasapa (Madison) lime with td 2305 ft.

Pipe Cutters and Threaders

Landis Machine Company, Waynesboro, Pennsylvania, announces availability of a 16-page illustrated bulletin describing pipe cutting and threading machines for all types and sizes and showing installations of these machines.

BRADFORD MOTOR WORKS INC.
OIL WELL SUPPLIES
BRADFORD, PA. — TULSA, OKLA.
EXPORT OFFICE, 30 CHURCH ST. NEW YORK CITY

B-M-W Balls and Seats
For Every Pumping Service

Monarch
Extrard
Bronze
Bi-Metal
Cromard
Bramo

What is your pumping problem? Sand? Ball Breakage? Softness? Corrosion? Lodestone? High Price? There are five B-M-W types, one of which will very likely prove to be ideal for YOUR particular conditions.

B-M-W Balls and Seats are obtainable at supply stores. If you want data from us on the principal B-M-W Products use the coupon below.

BRADFORD MOTOR WORKS, Inc., Bradford, Pa.:

Please send complete information on the following B-M-W Products without obligating us in any way:

- ☐ Balls and Seats (Made for every pumping service)
- ☐ ADMORE Insert Pump Anchors.
- ☐ TEX TYPE Plunger Fittings and Valves.
- ☐ Collins Belt Clamp.
- ☐ ARDMORE Insert Pump Anchors.
- ☐ NEILSON Tools (Safety Sucker Rod Hooks; Tubing Hooks; Sucker Rod Elevators; Sucker Rod Sockets; etc.).
- ☐ Please send representative.

Name_____
Firm_____
Street_____
City_____ State_____

ANOTHER Buckeye GOES down the line

Following the right of way easily and accurately. Digging close to all kinds of obstructions, putting the center of the trench within 26 inches of poles, buildings, trees, etc.

Speedily digging trench from 11½ inches to 22 inches in width and up to 5½ feet deep at a rate from 9 to 332 inches per minute.

Small enough to haul from one job to another, but built for steady, reliable service. Under its own power, it has a road speed of 4.37 miles per hour.

Model 11W is a Buckeye Ditcher you should know about. Ask for complete information.

THE BUCKEYE TRACTION DITCHER CO., FINDLAY, OHIO

BUCKEYE MODEL 11W DITCHER

FIELD EQUIPMENT Featured at International Petroleum Exposition

The National Supply Company

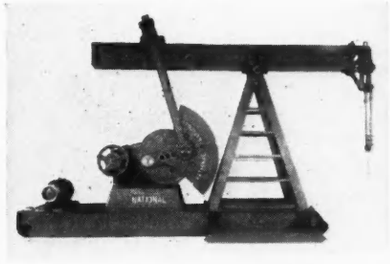
The exhibit of The National Supply Company covers an area of 9480 square feet and is the largest display of modern oil field equipment at the 1936 International Petroleum Exposition.

Ideal and National drilling and pumping equipment and Superior internal combustion engines incorporating the latest engineering developments in design and construction are shown in operation.

The complete exhibit is as follows:

▪ *Unit Pumpers*

A complete line of twin crank self-contained unit pumpers, with equalized double pitman, four-legged symmetrical

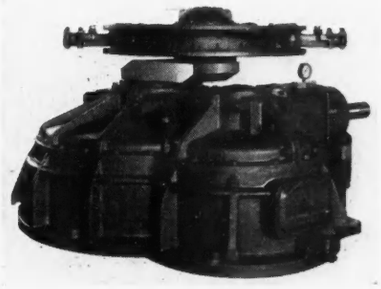


National Pumping Unit

samson posts, with herringbone reduction gear, and National dynamic disc cranks and counterweights, to meet every service requirement.

▪ *Geared Powers*

Single crank overpull type power particularly suited to geared design



National Geared Power

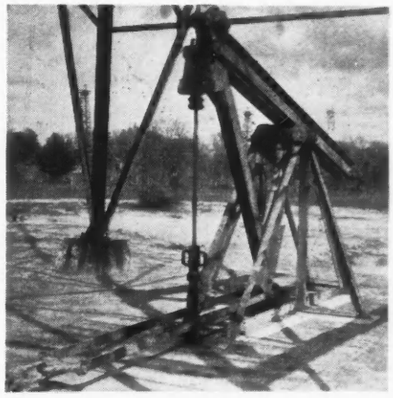
which permits using the rotating forged steel crank shaft mounted on wide spaced bearings.

▪ *Band Wheel Powers*

Cover field requirements of powers and jack pumping to 4000 feet depths. Generous proportional bearings combined with National's patented flood oiling system assure dependable service available in many band wheel and eccentric combinations.

▪ *Pumping Jacks*

National Type "D" Jacks are designed for the long stroke pumping of deep wells. They are of the underpull



National Pumping Jack

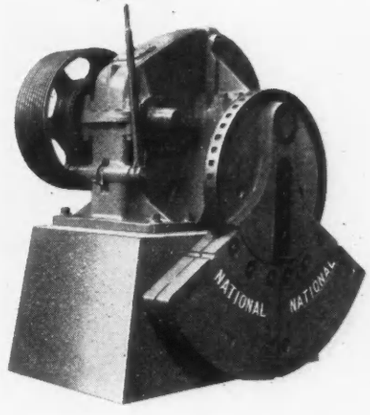
pattern and closely approximate straight-line motion. Rated strokes range from 36 to 48 inches. Conservatively rated polished rod loads, 8,000 to 13,000 pounds.

▪ *Beam and Post Assemblies*

Built to meet complete field requirements of single-well pumping and back cranking, include walking beam, pitman, wrist pin, samson post, and beam hanger, complete with reins, and polished rod clamp. They can be adapted to any type reduction gear or standard rig crank and crank shaft.

▪ *Reduction Gears*

National reduction gears are built in seven types to cover complete requirements of oil well pumping. Equipped with single or double disc cranks and counterweights they can be used to pump single wells or additional wells



National Reduction Gear

through back crank arrangements. Sykes herringbone gears generated by National are used throughout.

▪ *Sucker Rods*

Manufactured in five grades to meet complete range of pumping conditions in wells of all depths. Completely normalized, shot blasted to remove scale permitting application of a special baked enamel.

Ideal Crown Block

▪ *Crown Blocks*

Ideal crown blocks are designed and built for long life, simplicity, smoothness of operation, maximum speed and safety.

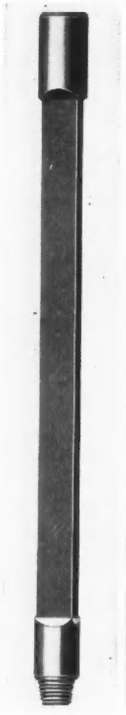
▪ *Traveling Blocks*

The line covers three types of blocks in sheave combinations from three to six. They are designed and built to withstand the most severe service. Sheaves are made of manganese steel and are mounted on extra heavy roller bearings. A patented guard built into the block eliminates all dangerous projections.

Ideal Traveling Block

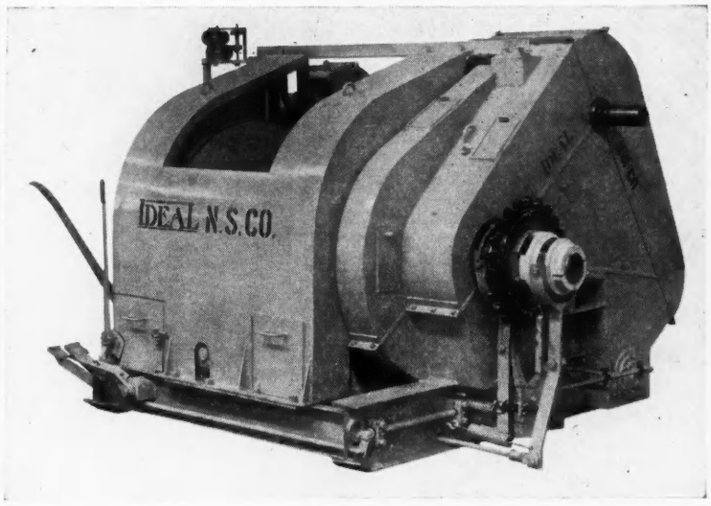
FIELD EQUIPMENT Featured at International Petroleum Exposition

Swivel



Drill Stem

Drill Collar



Draw Works

▪ *Swivels*

A new swivel that is presented to the trade to fulfill the present day demand for an efficient swivel for ordinary deep well drilling. Construction and design incorporate automatic wash pipe packing, automatic packing between housing and rotating sleeve, assembly of sleeve, coupling, and all bearings removable as a unit, preformed weldless bail with eyes bored in line, large pins through bail eyes carry the load in double shear, lower packing renewable without removing coupling, and automatic induced oil circulation.

▪ *Drill Stems*

Drawn in one piece from selected steel billetts. Forging and heat-treating produce a stem of superior grain structure and strength. Circulation holes are bored on true center and the wall sections are uniform.

▪ *Drill Collars*

The description "true center bore" for ideal rotary drill collars is derived from the manufacturing method employed in drilling circulation holes. Special machines which rotate the drill and drill collar in opposite directions impart a natural inclination for the drill to seek a true geometric axis of the collar.

National regular shop inspection requires that a 10-feet test bar, only ⅛-inch larger than the nominal bore, pass freely through every collar.

▪ *Rotary Drilling Machine*

Built for the heaviest requirements of present day rotary drilling. It is equipped with ball bearing table and roller bearing pinion shaft.

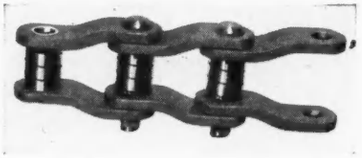
▪ *Draw Works*

The No. 23-9-FE is a new 1000 horse power unit, presenting many refinements which make for safe, fast, and economical drilling of the deepest wells. Salient features of construction include: chain drives, clutches and bearing supports enclosed, sprockets with machine-cut teeth and hardened driving surfaces, "cascade" lubrication of all chains and sprockets, rotary drive from drum shaft, water cooled brake rims with built-in piping, core bit reel drive sprocket on line shaft.

The 34-2R-FE Draw Works is a new 4-speed unit of 250 horse power capacity. It is a sturdy, self-contained unit, featuring ease of transportation and adaptability to any type motive power, making it especially suitable for use in undeveloped and isolated territories. Construction features: sprockets and machine-cut teeth and hardened driving surfaces, chains and sprockets totally enclosed, "cascade" lubrication of all chains and sprockets, two rotary drive speeds with drive and drum shaft, automatic lubrication of rotary drive.

▪ *Sprocket Chain*

The entire design and construction of the No. 3 and No. 4 chains provide exceptional strength, shock-absorbing qualities, and convenience of operation. Heat-treated alloy steel throughout and precision finish of all parts result in a strong durable chain capable of service under the severest loads.

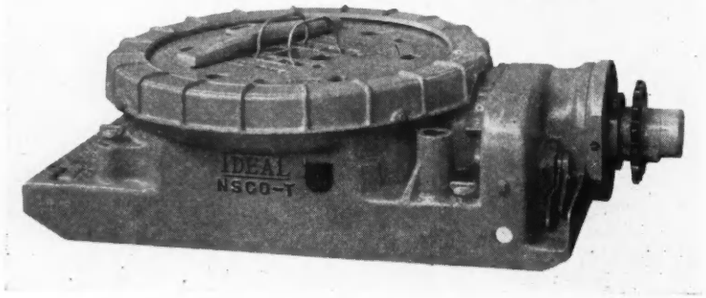


National Sprocket Chain

The Ideal 3⅛-inch pitch double roller chain has been made to handle the increasing demands of speed and heavy loads without too much sacrifice in flexibility. It is a precision made product with increased bearing area and will give longer wear than regular types of chain.

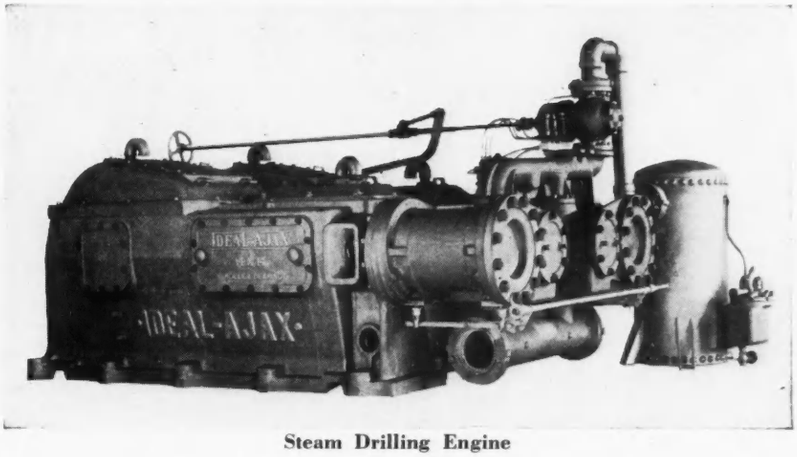
▪ *Boilers*

A new design of superheated boilers incorporating economy in fuel and water consumption with reduction in steam pressure, increase in fluid pres-



Ideal Rotary

FIELD EQUIPMENT Featured at International Petroleum Exposition



Steam Drilling Engine

sure pumped to well, increase in capacity, speed, and flexibility of the drilling rig; increase in life of pumps, engines, and boilers; and a decrease in weight which facilitates easy moving.

▪ *Steam Drilling Engines*

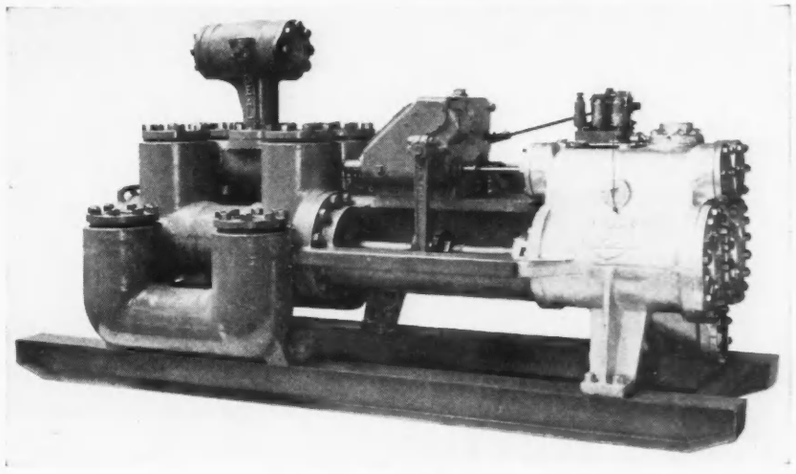
An engine of advanced design with the strength and power to meet every conceivable requirement in drilling the deepest of wells in a minimum of time.

▪ *Boiler Feed Pumps*

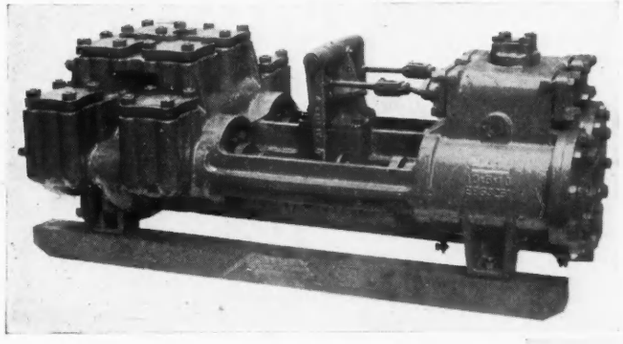
A modern designed pump to withstand the high steam and fluid pressures now in common use in the oil fields. Slush pump design is followed through the water end. Steam end is of piston valve type.

▪ *Steam Slush Pump*

A heavy-duty slush pump constructed to meet the most severe requirements



Steam Slush Pump



Boiler Feed Pump

of modern drilling methods. Rock shaft stand enclosed in an oil-tight case is automatically lubricated.

▪ *Power-Driven Slush Pumps*

Meets the requirements for fast drilling and higher pressures. Horsepower rating of power end and pressure rating of fluid end make these pumps capable of the same service as corresponding steam pumps. The pumps are adaptable to engine or motor drives, from either side, direct connected with V-belts or chains.

▪ *Rotary Rig Drives*

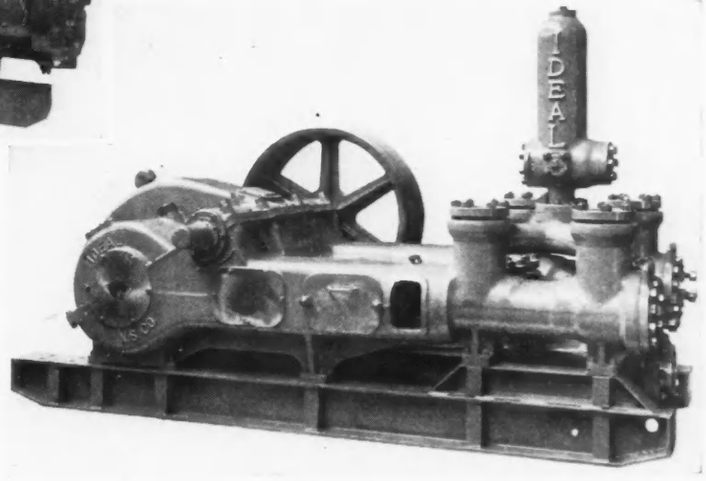
Pioneered by National engineers, these two types of rotary rig drives represent the latest development in modern rotary drilling.

▪ *Diesel-Electric Drilling Engine*

The Superior Diesel is of the 4-cycle mechanical injection type, built in 4, 5, 6, and 8-cylinder models, ranging in capacity from 175 to 350 horsepower to meet the requirements of rigs for drilling any depth well to a maximum of 12,000 feet. While built for heavy duty and continuous service, the use of the finest materials has made moderate speed possible. The units are self-contained each engine having built-in clutch, flexible coupling, roller bearings, and sheave for transmitting power by V-belts to generator, and mounted on heavy H-beams to facilitate setting up and hauling to and from location.

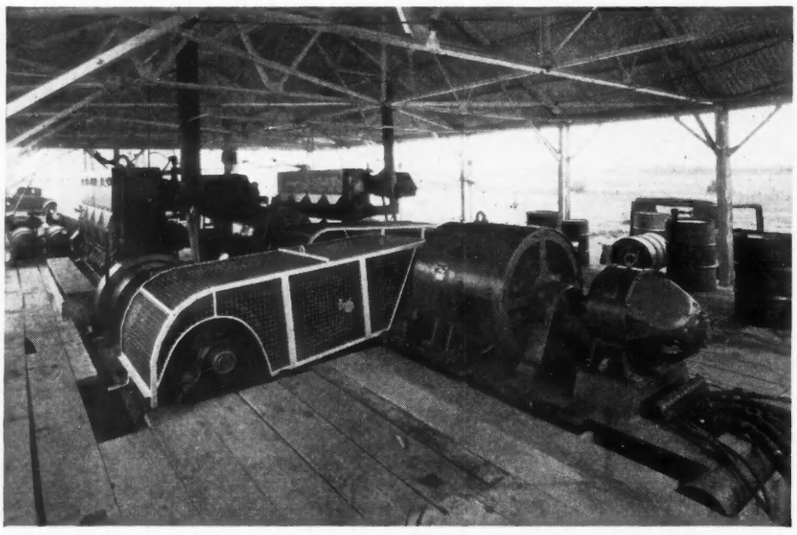
▪ *Diesel-Electric Power Units*

Superior Diesel-electric power units incorporate the lightweight Type GA

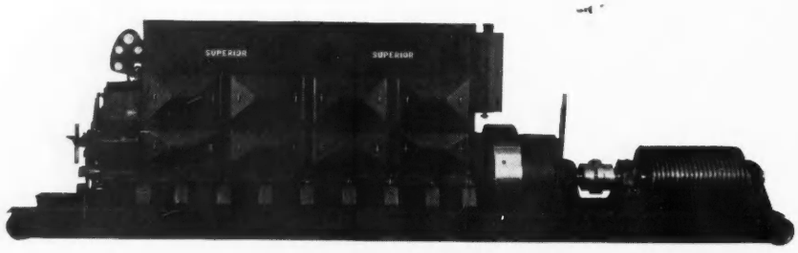


Power-Driven Slush Pump

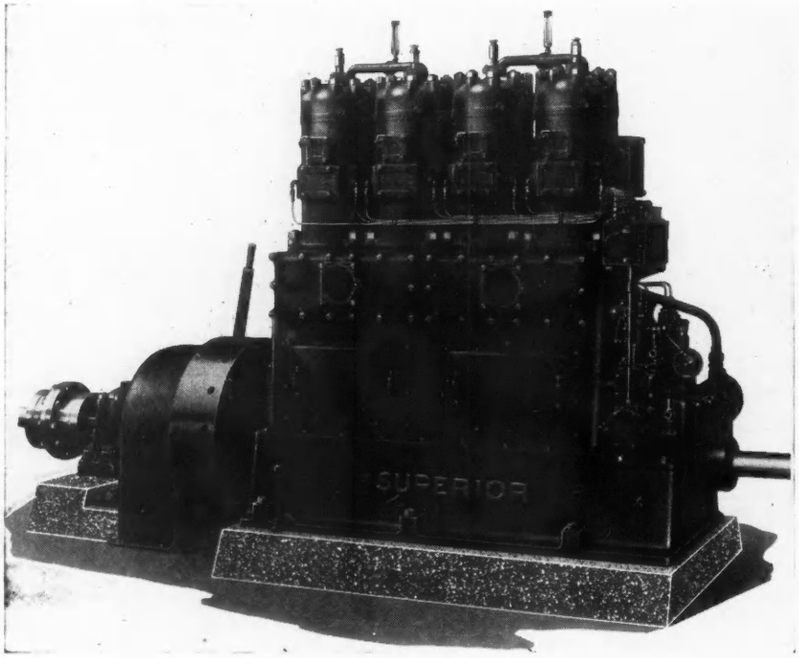
FIELD EQUIPMENT Featured at International Petroleum Exposition



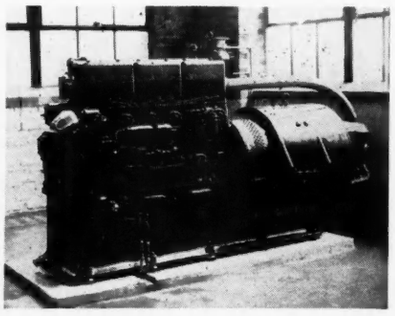
Rotary Rig Drive
(Described preceding page)



Diesel-Electric Drilling Engine
(Described preceding page)



Convertible Drilling Engine

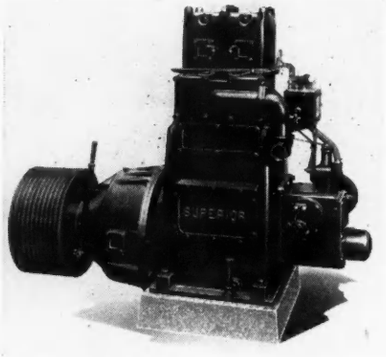


Diesel-Electric Power Unit

Superior Diesel engine made in 3 models with 2, 4, and 6-cylinder sizes with 4½-inch bore and 5¾-inch stroke and direct connected, close coupled generators, all mounted together on a standard box type base. Both AC and DC generators are available with capacities of 10 KW to 50 KW. The unit is sturdy, simple, and efficient, capable of continuous operation under heavy duty and suitable for uninterrupted service within reasonable limits of attention and maintenance. The regular operating speed of the engine for generator service, 1200 r. p. m.

▪ *Convertible Gas Engine*

The Superior Type F two-cycle gas engine has a 6-inch bore and 7-inch stroke with a rating of 30 horsepower at 600 r. p. m. This engine embodies many new and outstanding features,



Convertible Gas Engine

providing smoothest possible performance, improved efficiency, maximum dependability, and long life. It is especially economical and efficient for individual well pumping service.

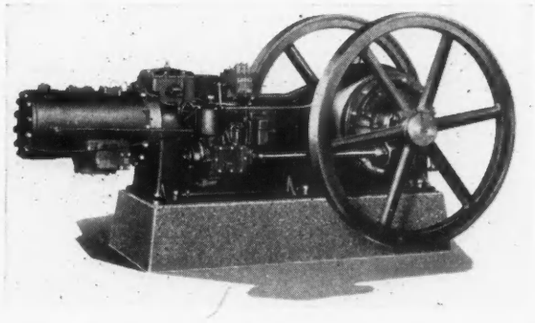
▪ *Convertible Drilling Engines*

The Type G engine is available in 2- and 4-cylinder models, with bore and stroke 7½ x 8-inch, developing from 50 to 100 horsepower at 600 r. p. m.

The Type M engine is built in 2, 4, and 6-cylinder models, with bore and stroke 8¾ x 9½-inch, developing from 75 to 235 horsepower at 600 r. p. m.

These engines have the dependability and simplicity of slow speed engines together with the flexibility, small space requirements and low installation cost of the high speed type. They are

FIELD EQUIPMENT Featured at International Petroleum Exposition



Type C Gas Engine

furnished with or without built-in clutch, sheave or pulley, and can be readily adapted to any gear chain or belt driven unit.

▪ *Gas Engine*

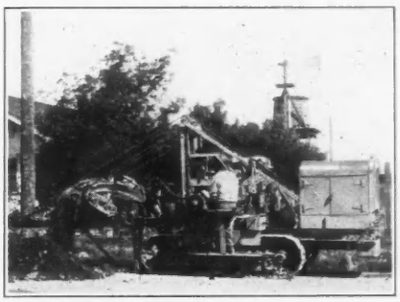
Type C horizontal two-cycle gas engines are made in 5 sizes with ratings at 20, 30, 40, 45, and 50 horsepower at 200 r. p. m. The regular maximum speed is 350 r. p. m. Many new and outstanding features are embodied in these engines. The design is of the approved crosshead type which eliminates the objectionable characteristics of horizontal and vertical, two-cycle trunk-piston or crank case scavenging type engines, such as crank case explosions, waste of lubricating oil, bearing troubles, etc. Construction is completely enclosed, oil-tight, dust and water-proof yet easily accessible for inspection or repair. Conversion from gas to oil fuel or vice versa can be made in the field at a nominal expense.

Buckeye Traction Ditcher Company

▪ *Utility Ditchers*

The Buckeye Traction Ditcher Company, Findlay, Ohio, is exhibiting at Tulsa three of its smaller, general utility ditchers.

Model 16 is the smallest of the three, with cutting widths ranging from 9½-inches to 16½-inches. The unique feature of this new model is the newly developed alligator traction wheels which are built to provide ample support with good traction on soft ground, while permitting the machine to be driven at normal road speeds—up to 27 miles per hour—when moving from one job to the next. The ditcher is built on a standard 1½-ton, 157-inch wheel base truck chassis, with special reinforcements to the frame and the addition of helper springs in the rear. A



Buckeye Model 12

frame for supporting the idler wheels of the alligator traction is built into the rear wheel assembly. A flexible tread belt, made up of electric cast steel units, is coupled around the dual tires and the idler wheels, being driven directly through the tires. When the machine is to be moved to another location this tread belt is uncoupled and wound up on reels provided at the sides of the chassis. With idler wheels removed, the frame clears the road by 8½ inches. The complete change from alligator traction to normal truck wheel operation, or back to alligator traction, is easily made in 20 minutes, it is claimed. A special mid-ship transmission provides the necessary speed reductions for digging speed and digging wheel transmission, with a range of digging speeds from 1.45 feet to 15.85 feet per minute.

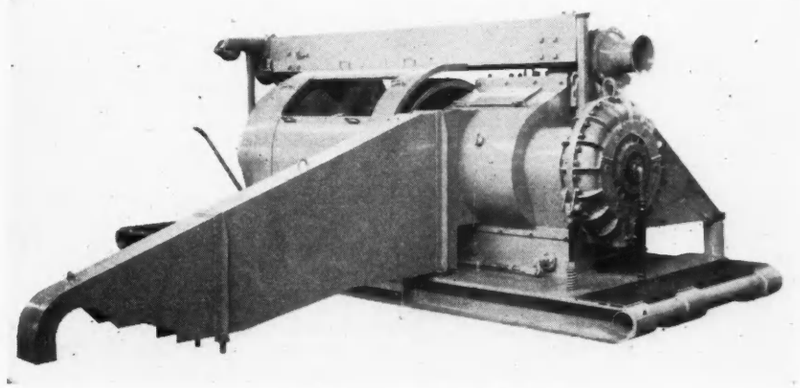
Other Buckeye ditchers shown, Models 11 and 12, both have the same capacities of trench width and depth—from 11½-inch to 22-inch width and up to 5½ feet in trench depth. The Model 12 is built for heavier going. Digging speeds in this model range from 16 inches to 117 inches per minute, while the Model 11 has digging speed range from 7.4 inches to 469 inches. Model 12 is the heavier machine and has a greater overall width. While both machines are readily maneuvered and can turn in their own length, the Model 11, because of its narrower over-all width, can get closer to obstructions. When cutting a 22 inch trench, the machine can put the edge of the trench within 15 inches of obstructions. Where a minimum size trench is needed, Model 11 can be supplied with a special digging wheel with buckets that cut an eight inch trench and the digging wheel may be so placed as to bring the edge of this smaller trench to within 15 inches of obstructions.

Motor Improvements, Inc.

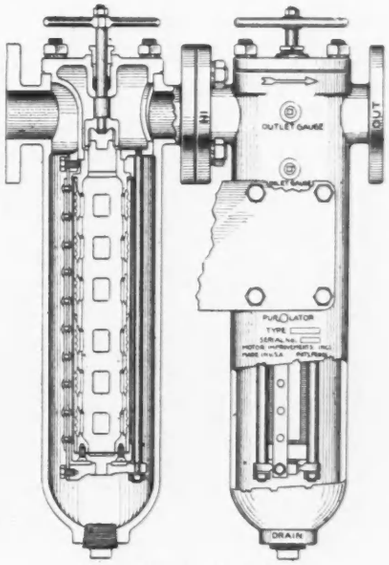
▪ *Oil Filters*

Motor Improvements, Incorporated, Newark, New Jersey, is exhibiting at Tulsa a "Purolator" oil filter particularly designed for use on pipe line pump station engines. The filter is a two-unit proposition, assembled in series to give two stages of filtration between the supply pipe and the high pressure pumps of the motors, or engines, to be served. Crude oil from pipe lines can be passed through these filters and used in Diesel pumping engines, it is claimed.

Filter housings are of cast iron, and the elements are of cast iron and steel with bronze wire. Elements are cleaned by stationary knives by means of handles in the housing head which turn the element against the knives. Either element may be withdrawn for inspection without breaking the oil line.



National Rotary Draw Works



"Purolator" Oil Filter

This Week with the Industry's EQUIPMENT SUPPLIERS

Bloss to Head International Derrick Beaumont Plant

Announcement was made that Richard R. Bloss, vice president of International-Stacey Corporation, will take over management of International Derrick & Equipment Company at Beaumont, Texas, a subsidiary of International-Stacey Corporation.

Burwell Boykin, Jr., formerly in charge, is retiring from active service but will continue his connection with the company as a member of the board of directors. The Beaumont division specializes in the design and construction of heavy rotary drilling equipment known to the trade as Boykin Greyhound Products.

Bloss has been connected with The International Derrick & Equipment Company of Columbus, Ohio, for 15 years and has a wide experience in the design and manufacture of oil country products. He has to a large extent been responsible for the development of the present line of IDECO products. He is an aeronautic enthusiast, and flies his own ship.

Wilson Supply Opens Tulsa Sales Office

Wallace Wilson, president Wilson Supply Company of Houston, announces that his firm has opened a sales office in Tulsa, Oklahoma. Quarters have been taken at 1702 National Bank of Tulsa Building.

M. L. (Bud) Williamson has been named manager of the Tulsa sales organization.

Oil Center Tool Building New Plant

Oil Center Tool Company is nearing completion of the new Houston plant, architect's drawing of which is shown here. This new home of O-C-T products furnishes 16,000 square feet of floor space for manufacturing, and is all-steel construction, faced with brick front. Location is on Air Line Road, several blocks from the original site where a small machine shop started the company in 1927. The company has grown to a $100,000 capitalization, and ranks among the industry's largest builders of high-pressure surface control equipment.

More than $30,000 in new equipment is being moved into the new plant, including a 7½-ton electric crane of the latest type, having a 40-foot span, and two 20-foot traveling cranes for side travel. Total investment at this time on the new factory approximates $87,000, and will speed up manufacture immensely.

Chain Belt Appoints Pitts Representative

Chain Belt Company, Milwaukee, Wisconsin, announces appointment of W. A. Pitts as special representative in the oil fields. Pitts has been connected with the oil drilling game for quite some time, and has had actual experience in production and drilling work and the manufacture of rotary drilling equipment. He will work out of Oklahoma City, where his office will be at 1513 North Pennsylvania Street.

Kennedy Valve Appoints Guiry Chicago Manager

Kennedy Valve Manufacturing Company of Elmira, New York, has appointed R. M. Guiry as manager of its Chicago branch office and warehouse. Guiry has been in the company's Chicago office for the past nine years.

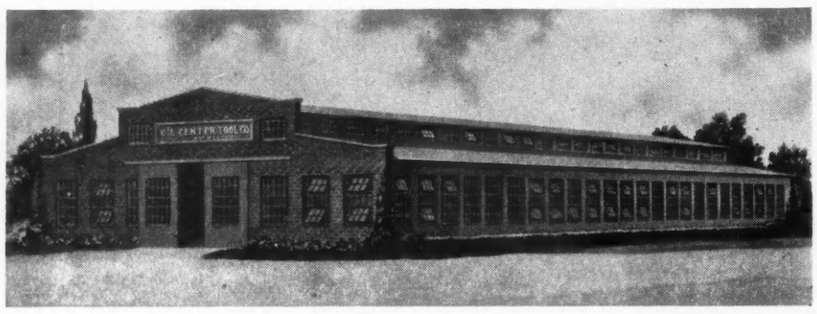
Bridgeport Machine Opens New York Office

Bridgeport Machine Company, manufacturers and distributors of oil drilling, fishing and production equipment, with headquarters at Wichita, Kansas, has opened eastern and export offices at 30 Rockefeller Plaza, with Ralph Hague in charge.

Hague has been with the company in various capacities for 15 years in the Mid-Continent fields and is well known to oil producers.

Other executive offices of the company are maintained at Dallas, Houston, San Antonio, Tulsa and Oklahoma City for close cooperation with many oil interests. Equal service facilities are now assured Eastern and export buyers through the practical and intimate knowledge which Hague can supply in New York concerning both rotary and cable tool drilling.

An additional service now offered by the Bridgeport Machine Company is a semi-monthly bulletin covering all vital points of interest in the oil business, which will be mailed free to anyone connected with the oil business.



Oil Center Tool Company's New Plant at Houston

Buda Organizes New Company in Texas

The Buda Company, Harvey, Illinois, has announced the organization of Buda Engine & Equipment Company, with headquarters at 1003 Shell Building, Houston, Texas. A warehouse and shop are also located in Houston. A complete stock of Buda oil field power units and all necessary accessories will be carried at all times. A modern up-to-date store has been opened in Kilgore.

Lincoln Electric Company Transfers Three Men

Lincoln Electric Company, Cleveland, Ohio, announces the following changes and promotions in its sales personnel: J. S. McKeighan has been transferred to the sales staff in Dayton, Ohio, operating under the Cincinnati district office; J. B. McCormick has been transferred from the Philadelphia office to Fresno, California, under the personnel of the Los Angeles office; Paul W. James has been transferred from the factory to Binghampton, New York, operating under the Syracuse office.

D+B Pump Men Visit Texas Plant

Chas. D. Wagner, vice-president and manager, accompanied by E. E. Stevenson, chief engineer of the D + Pump & Supply Company of Los Angeles, California, left this week for Tulsa to attend the mid-year meeting of the American Petroleum Institute, and the International Petroleum Exposition and Congress, after which they will spend some time at the company's new enlarged plant recently completed at Dallas, Texas. Before returning to Los Angeles they will cover the Mid-Continent and Gulf Coast fields for the purpose of making a general survey of conditions in those territories.

Republic Steel Opens Second New York Office

The New York district sales office of Republic Steel Corporation has opened a new sub office in the State Bank Building, Albany, New York, with J. M. Higinbotham salesman in with J. M. Higinbotham, salesman.

E. L. Decker Makes Extended Trip

E. L. Decker left Long Beach the latter part of April on an extended sales trip, the first leg of which took him to Texas. From the Gulf Coast his itinerary took him to Tulsa to look after the Martin-Decker exhibit at the International Oil Show. Following the show the Mid-Continent fields will be covered and then he will go on to New York to look after the company's export business. Later on the Rock Mountain territory will be visited. He will be away from his California office about four months.

Geo. J. Hix Company Acquires New Property

The Geo. J. Hix Company of Dallas, Texas, engineers and distributors of power and handling equipment, have recently acquired the modern business property at 2413-15 Commerce Street, Dallas. The company is general representative for a number of manufacturers and specializes in mechanical transmission of power supplies, hoists, conveyors, chains and transmissions.

ALL-ALLOY RIDGID

The Pipe Wrench with the UNBREAKABLE HOUSING

Housing and handle are made of a remarkable new alloy that doubles the old strength on which RIDGID built its reputation.

Jaws are of chrome molybdenum alloy, entire jaws oil hardened.

RIDGID Wrenches more than meet Government requirements, pass Navy test No. 1-GGG-W-651.

End Pattern, 6" to 36". Same features as regular RIDGID

BUT THAT'S NOT ALL

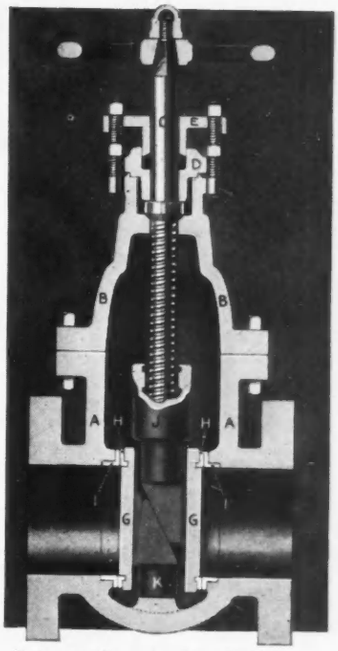
These wrenches win the battles of the oil fields. Strength that equals any. Replaceable heel jaws. Can't be locked on a pipe. Adjusting nut that spins freely in open housing in all sizes. Also made in End pattern for pipes against walls and other tight places. Millions of RIDGID Tools in use all over the world. Ask your jobber.

THE RIDGE TOOL COMPANY
ELYRIA, OHIO, U. S. A.

RIDGID

Pipe Wrenches, Threaders, Cutters, Vises, Extractors

LUDLOW VALVES are RUGGED



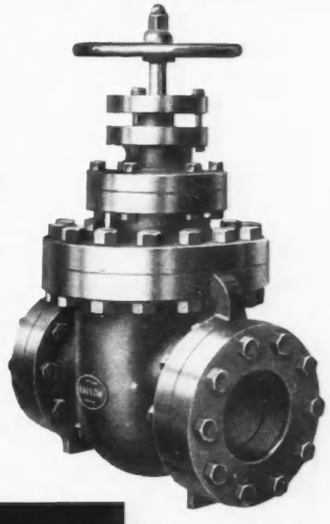
Cross section showing Ludlow double gate devices.

This diagram shows the basic design of every Ludlow valve—its simplicity, small number of parts and "fool proof" design—its *ruggedness.*

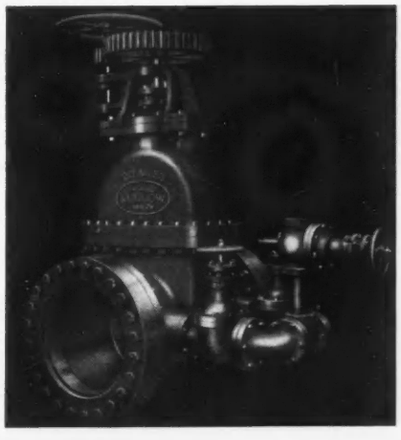
That ruggedness explains why there are Ludlow valves in service today that have been on the job for 30 and 40 years without repair.

If you need tight closure—and what valve installation doesn't—you can get it by specifying "Ludlow."

The line includes brass, bronze trimmed, and iron body valves in complete size range; for light, medium and heavy duty service. Ludlow has also furnished valves for special service to the Petroleum Industry for many years. Tell us your requirements and let us recommend the proper Ludlow valves to handle them.



A heavy duty Ludlow for high pressure work.



Typical example of Ludlow special valve service.

The LUDLOW VALVE MFG. CO.
TROY, NEW YORK

OFFICES IN ALL PRINCIPAL CITIES

Squeaks from the Bull Wheel

Eggs-actly

Hi: "What was that explosion on Cy's farm?"

Ram: "He fed his chickens some 'lay-or-bust' feed, begosh, and derned if the rooster didn't get some of the dratted stuff."

He was An Elk

"Something?"

"Yes. A book for my husband."

"Here's a volume of nautical stories."

"My husband's an Elk and, of course, he hears all the naughty stories."

Izzy and Ikey

"Fadder, give me a dime to go and see the sea serpent."

"Vasteful boy! Here's a magnifying glass; go find a vorm."

Unsurpassed

Professor: "This is the stadium."

Visitor: "Fine! Now take us through the curriculum. They say you have a fine one here."

He Could Trust Her

"Mose, you lazy rascal, do you think it right to leave your wife at the washtub while you spend your time fishing?"

"Oh, yassuh, mah wife doan need no watchin'. She'll wuk jest as hard as if'n I wuz erer."

Cosmopolite

Stranger: "How far is it to Washington?"

Native: "Don't know but I'll call Eph. Eph'll know. He's travelled all over. Eph's got shoes."

Smart Boy

The small boy had been punished for being disobedient. Presently his parents found him at the telephone.

"Bobby, what are you doing?" they asked.

"If you want to know," he replied, "I'm telephoning the preacher to get a divorce from both of you."

Distinction

"Papa, what is a traitor in politics?"

"A traitor is a man who leaves our party and goes over to the other one."

"Well, then, what is a man who leaves his party and comes over to yours?"

"A convert, my boy."

And a Woman Still Behind Him

"Yes, much depends on the formation of early habits."

"That's true. When I was a baby my mother hired a woman to wheel me around, and here I have been pushed for money ever since."

Proof of Benefit

A college student secreted a barrel of ale in his room and made good use of it. At last a master heard of it and sent for him. The student's defense was that his doctor had ordered him ale each day as a tonic.

"Indeed!" said the master with sarcasm. "And may I inquire if it has improved your condition?"

"It has," replied the student. "When I first had the barrel I could scarcely lift it, but now I can carry it with the greatest of ease."

Distant Relation

At the wedding anniversary of a magnate, one of the guests, noticing a somewhat lonely looking and rather shabbily attired man in a corner, walked over and sat beside him.

"I was introduced to you, but did not catch your name," he said.

"My name," replied the other, "is Blan."

"Oh, then you are a relative of our host?"

"Yes," rejoined the poor relation. "I'm a cousin $200.000 removed."

No Flattery

The judge who was about to deliver a severe sentence looked at the defendant in the dock and began: "This robbery was consummated in an adroit and skillful manner."

The prisoner blushed and interrupted: "Come now, your honor. No flattery, please."

Wants Offset

Thibodaux, La.
May 9, 1936.

Monsieur Oil Weekly,
Houston-by-de-Bayou, Texas.
Dear Monsieur Weekly:

I got me some troubles wid dese oil well which make for my heart one veree beeg ache, yes! I see my fran, Alcide Broussard, an' he say to me dat you a veree smart mans what can pass to me some help wid dis oil well business. So I say to myself: "By gar! I t'ink I write you some letter!"

I owns for myself de forty acre of de lan' down in de side o' de bayou what I have lease wid de beeg oil company t'ree year ago. My fran, Alcide, he is got for himself some lan' in de bayou bank too. Dees beeg oil companee she deeg to de oil well on dem lan' what belong to Alcide. Me, I ain't got no deeging in my lan'. An' Alcide he git de monies every mont', but me, I ain't git nothin' yet!

I make a pass down by de oil companee office, an' I say to dem head mans: "For why don' you deeg to de oil on MY lan'." An' he say to me: "Pierre, you will have to wait until you get an offset."

Monsieur Weekly, what is des thing what is call "offset?" Me, I don' know nothing about dis "offset" t'ings. But if you tell me where I buy one, I dam' sho try to git it! I got for myself some monies what I git for de mus'rat hide, an' maybe she is enough to buy for myself dis "offset" so I git de oil well de same as Alcide. I ask Alcide where do he git his "offset," but I don' know nothin' from him, no. Maybe de Sacre Dieu jus' put de "offset" in Alcide's lan' long, long time ago, no?

I ask from you dat you tell to me who sell dis "offset." Maybe you is got a second-han' one what you sell to me cheap.

Me, I git planty monies when dis companee deeg to a well in my lan'. I ain't sold nothing except dis thing what is call "royalty." Dem Houston mans what buy dem "royalty" he say I still own de lan'. So ol' Pierre he gonna git reech lak one beeg son-of-a-gun, no? When de monies she start to rollin' in, me, I stew up one dam' beeg duck gumbo wid de rice; an' by gar! You git dem invitation, yes!

So Monsieur Weekly, if you can help wid me to buy dis things what is call "offset," I be your beeg fran!

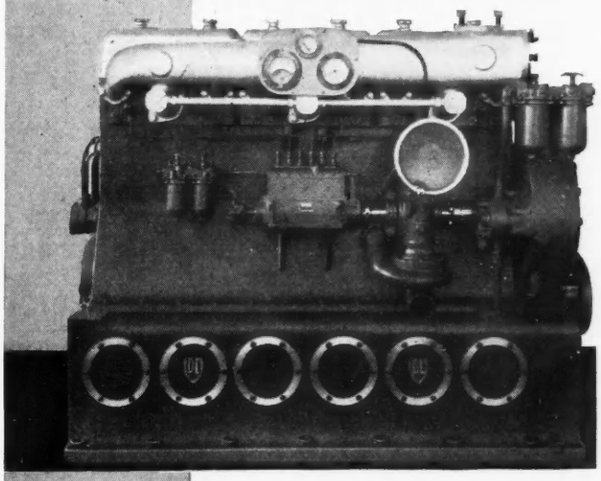
My sow hog he is veree, veree seek, yes!

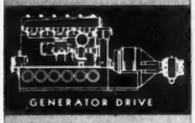
Hoping you are de same, I am, me,

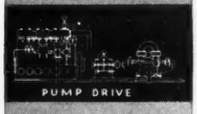
Dat ol' Cajan,
PIERRE DEROUEN.

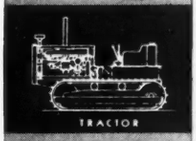
Gott
WATER CAN
Gotkool
WATER CANS
& COOLERS
GOTT Water Cans are the practical way to keep drinking water cool for long periods, protected from impurities and always handy to the job. Snug fitting large removable top, strongly built to withstand rough usage. GOTT Water Coolers have extra large covers and a handy non-leaking push button faucet. Your Supply Store has them, get one today! . . . . . .
GOTT WATER CAN
Made in 1½, 3, 5, and 10 gallon sizes.
GOTT WATER COOLER
Made in 3, 5, 8, 10, and 20 gallon sizes.
H. P. GOTT MFG. CO.
WINFIELD, KANSAS
KEEP PURE DRINKING WATER ALWAYS HANDY

Now.. A NEW SERIES OF
LIGHTER
SMALLER
FASTER
DE LA VERGNE DIESEL ENGINES




GENERATOR DRIVE


PUMP DRIVE


TRACTOR

INDUSTRIAL LOCOMOTIVE

RAIL CAR

. . . with a wide field of application ranging from generator drives and centrifugal pump drives to industrial locomotives, rail cars, tractors, mobile cranes, contractors' equipment and miscellaneous services.

Built in 4, 6 and 8 cylinder sizes and capacities ranging from 100 B. H. P. to 400 B. H. P. at engine speeds from 514 R. P. M. to 1200 R. P. M.—these engines incorporate every worthwhile advance in high speed engine design—employ the finest materials ever used in diesel engine construction, the experience of the automotive and aircraft industries being heavily drawn upon in this respect.

Write for bulletins descriptive of these new engines.

Established Machinery Dealers are Invited to Inquire Concerning Sales Agencies

DE LA VERGNE DIESEL ENGINES

DE LA VERGNE ENGINE CO.
PHILADELPHIA
Sales Agent for Baldwin-Southwark Corp., Subsidiary of Baldwin Locomotive Works

Attention Producers!

If you would like to make the

OIL SHOW PAY DIVIDENDS

don't miss the

JENSEN EXHIBIT

of

JENSEN
Straight Lift
PUMPING UNITS
and
Straight Lift
ROD LINE JACKS

New and Improved

If you can't make the Show this year, write or wire us before you equip that pumper! We don't want your business unless we can improve the efficiency and economy of your operations!

JENSEN BROTHERS MANUFACTURING COMPANY
Coffeyville, Kansas

INDEX TO ADVERTISERS

A

	Page
J. S. Abercrombie Co.	—
Abercrombie Pump Co.	205
Ajax Iron Works	95
Allis Chalmers Manufacturing Co.	—
Allsteel Products Manufacturing Co.	—
Amerada Petroleum Corp.	187
American Askania Corporation	202
American Assn. of Petroleum Geologists	—
American Cable Co.	—
American Hammered Piston Ring Co.	—
American Iron & Machine Works	—
American Lubricator Co.	—
American Meter Co.	59
American Roller Bearing Co.	32
American Rolling Mill Co.	—
American Sand-Banum Co.	189
American Seismograph Co.	206
American Steel & Wire Co.	—
Anderson-Pritchard Oil Corp.	—
Ash Grove Lime & Portland Cement Co.	—
Athey Truss Wheel Co.	—
Atlas Powder Co.	—
Axelson Manufacturing Co.	—

B

Baash-Ross Tool Co.	10-11
Baker Oil Tools, Inc.	90-91
Baldwin-Duckworth Chain Corp.	62
Baroid Sales Co.	25
The Barrett Co.	—
Wm. M. Barret, Inc.	206
The Bartlett-Hayward Co.	17
Beaumont Iron Works	—
Beaver Pipe Tools, Inc.	197
Black-Sivalls & Bryson	Third Cover
Bradford Motor Works	208
The Brewster Co.	142-143
Bridgeport Machine Co.	123
The Broderick Co.	—
Broderick & Bascom Rope Co.	28
Brown Tool Co.	—
Buckeye Traction Ditcher Co.	208
A. M. Byers Co.	—
Byron Jackson Co.	—

C

Cameron Iron Works	—
Carson Machine & Supply Co.	—
J. I. Case Co.	—
The Cavins Co.	204
Chain Belt Co.	12
Chiksan Oil Tool Co.	195
Chemical Process Co.	—
Clark Brothers Co.	61
Clark Hotel	198
Robert P. Clark Co.	206
Columbian Steel Tank Co.	—
Continental National Bank	—
Continental Oil Co.	75
The Continental Supply Co.	—
Fred E. Cooper Co.	13
Cooper-Bessemer Corp.	22-23
The Corbett Corp.	—
Corona Products, Inc.	193
Cummings Engine Co.	—
W. H. Curtin Co.	188

D

Darling Valve & Manufacturing Co.	65
The Dayton Rubber Manufacturing Co.	83
Dean Core Barrel Mfg. Sales & Service	24
De La Vergne Engine Co.	217
Demag, A. G.	14
Diamond Metal Co.	—
David Donoghue	206
Dowell Incorporated	—
E. I. du Pont de Nemours & Co.	111

E

Eastman Oil Well Survey Co. of Texas	101 and 117
Economy Electric Lantern Co.	207
Elliott Core Drilling Co.	33
Emsco Derrick & Equipment Co.	69

F

Geo. E. Failing Supply Co.	—
Fairchild Aircraft Corp.	121
First National Bank of Forth Worth	—
First National Bank, Houston	156
First National Bank & Trust Co. of Texs.	—
Foote Bros. Gear & Machine Works	—
Fort Worth Laboratories	206
Fort Worth National Bank	—
Four Wheel Drive Auto Co.	16
The Fox River Rig & Lumber Co.	193
Frick-Reid Supply Corp.	118-119

G

Gardner-Denver Co.	—
The Garlock Packing Co.	203
Garrott Brass & Machine Co.	—
Gas Power, Inc.	—
Gaso Pump & Burner Manufacturing Co.	—
Gearench Manufacturing Co.	—
General Electric Co.	173
Geophysical Service, Inc.	175
L. H. Gilmer Co.	20
Globe Oil Tools Co.	164-165
Goodall Rubber Co. of Texas	—
B. F. Goodrich Rubber Co.	—
Goodyear Tire & Rubber Co.	—
H. P. Gott Manufacturing Co.	216
Grant Oil Tool Co.	—
Gray-Kerotest	—
Gray Tool Co.	124-125
Greene, Tweed & Co.	195
The Guiberson Corp.	140-141
Gulf Envelope Co.	—
Gulf Publishing Co.	127
Gulf States Utilities	170
Gustin-Bacon Manufacturing Co.	—

H

Hall & Lowery, Inc.	188
Halliburton Oil Well Cementing Co.	—
Hardway & Cathey	206
Harnischfeger Corp.	102-103
Harrisburg Steel Corp.	—
Haynes Stellite Co.	3
Hazard Wire Rope Co.	89
C. M. Heeter Sons & Co.	—
Hercules Tool Co.	148
Hewitt Rubber Corp.	—
Hinderliter Tool Co.	—
Hoard Exploration Co.	206
Chas. N. Hough Manufacturing Co.	—
Houston Oil Field Material Co.	—
Houston Ready-Cut House Co.	—
Hughes Tool Co.	Fourth Cover
Hyatt Roller Bearing Co.	—
Hydril Co.	First Cover

I

Independent Exploration Co.	—
Independent Pipe & Supply Co.	—
Ingersoll-Rand Co.	6
International Cement Corp.	—
International Derrick & Equipment Co.	109
International Harvester Co.	49
The International Nickel Co.	—
The International Petroleum Exposition	—
Irving Air Chute Co.	—

J

Byron Jackson Co.	—
Jarecki Manufacturing Co.	—
W. P. Penny	206
Jenkins Brothers	146
Jensen Brothers Manufacturing Co.	217
Johns-Manville	—
S. M. Jones Co.	34
Jones & Laughlin Steel Corp.	129
The Jones Oil Well Reamer Co.	170
Earle M. Jorgensen Co.	—

K

Kerotest Manufacturing Co.	21
Kibele Manufacturing Co.	—

L

Lamb Piston Sales Co.	—
Landis Machine Co.	36
Larkin Packer Co.	—
The Lane-Wells Co.	27
The Layne & Bowler Co.	144-145
Le Roi Co.	—
A. Leschen & Sons Rope Co.	115
The Lincoln Electric Co.	—
Link Belt Co.	80-81 and 201
Lucey Boiler & Manufacturing Corp.	—
Neal Lucey Co.	—
Ludlow Valve Manufacturing Co.	215
Lufkin Foundry & Machine Co.	—

M

MacClatchie Manufacturing Co.	—
Maintenance Engineering Corp.	166
D. S. Mair Machinery Corp.	—
Maloney Tank Manufacturing Co.	137
Martin-Decker Corp.	—
McAlpin Hotel	—
McIntosh & Seymour Corp.	—
Merco Nordstrom Valve Co.	Insert 98-99
Mid-Continent Pump Supply Co.	9
Miller Sand Pump Co.	—
Mission Manufacturing Co.	133 to 136
Lee C. Moore & Co.	—
Motor Improvements, Inc.	113
Muskogee Iron Works	—

N

National Bank of Tulsa	—
National Exploration Co.	—
The National Supply Co.	54-55
National Tube Co.	—
Naylor Pipe Co.	8
New Deal Specialty Co.	147
Norma-Hoffman Bearings Corp.	—
Norvell-Wilder Supply Co.	118-119

O

Walter O'Bannon Co.	207
O.C.S. Manufacturing Co.	85
Oil Center Tool Co.	—
Oil City Brass Works	—
Oil Well Supply Co.	—
Oster Manufacturing Co.	—
Otis Pressure Control	—

P

The Parkersburg Rig & Reel Co.	138-139
Patterson-Ballagh Corp.	30
Pelican Well Tool & Supply Co.	190
Petroleum Electric Power Club	158-159
Petroleum Rectifying Co.	163
Petty Geophysical Engineering Co.	—
The Pierce Governor Co.	194
Pittsburgh Equitable Meter Co.	Insert 98-99
Pittsburgh Steel Co.	26
Portable Rig Co.	—
Producers Supply & Tool Co.	—

R

J. P. Ratigan Co.	—
Rector Well Equipment Co.	—
Reed Roller Bit Co.	149 to 152
Joseph Reid Gas Engine Co.	31
The Republic Rubber Co.	15
Republic Steel Corp.	4-5
Norman H. Ricker	206
The Ridge Tool Co.	215
Dewey T. Ross, Inc.	—
Walter Ruska & Co.	—

S

Scandanavia Belting Co.	198
J. A. Schley	206
Schlumberger Well Surveying Corp.	—
Security Engineering Co.	—
Seismic Explorations, Inc.	—
The Shaffer Specialty Co.	—
Shaffer Tool Works	107
Shell	—
Sinclair Refining Co.	—
SKF Industries, Inc.	79
A. O. Smith Corp.	86-87
E. M. Smith Co.	196
Nowery J. Smith Supply Co.	—
South Chester Tube Co.	67
South Texas Geophysical Corp.	207
Southern Engine & Pump Co.	—
Southern Pacific Lines	174
Spang & Co.	160
Spang, Chalfant & Co.	76-77
Sperry-Sun Well Surveying Co.	—
Star Drilling Machine Co.	—
The Sullivan Co.	114

T

Taubman Supply Corp.	18-19
Technical Oil Tool Corp.	187
Texas Electric Steel Castings Co.	—
Texas Iron Works	29
Thermoid Rubber Co.	157
Thornhill-Craver Co.	—
The Timken Roller Bearing Co.	47
Tips Engine Works	—
Titusville Iron Works Co.	—
Tnemec Co.	153
Edgar Tobin Aerial Surveys	—
Tretolite Co.	—
Trimont Manufacturing Co.	—
Twin Disc Clutch Co.	—

U

Union Carbide & Carbon Corp.	—
Union Wire Rope Co.	Second Cover
United States Rubber Products, Inc.	—
United States Steel Corp.	—
United Supply & Manufacturing Co.	199

V

Volcano Burner Co.	7

W

Waukesha Motor Co.	192
Westinghouse Electric & Mfg. Co.	57
The Wheland Co.	—
Wickwire-Spencer Steel Co.	—
J. H. Williams & Co.	—
W-K-M Co.	—
Williamsport Wire Rope Co.	97
Wilson-Snyder Manufacturing Co.	—
Wilson Supply Co.	177
George Woods Agency	—

Y

Youngstown Sheet & Tube Co.	73

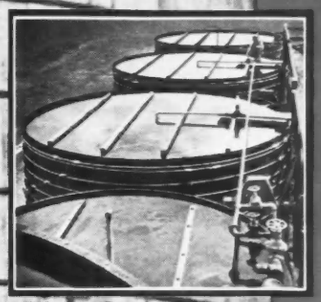
B.S.&B. DURABLE WOOD TANKS

CHECK EVAPORATION

PREVENT CORROSION

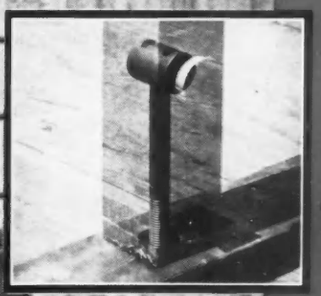
CUT HEATING COSTS

NO RUST . . . NO LEAKS



Water Decks Irrigate Grooved Staves. Tanks Stay Moist and Tight.

Stud Flanges Protect Bolts from Corrosion.



Strong Tie Posts Hold High Internal Pressure.

No steel is exposed to corrosion

Export:
Continental-Emsco
New York City

SAFETY EFFICIENCY BS&B

Write
For Illustrated
Literature

Black, Sivalls & Bryson

(INC.)

OKLAHOMA CITY

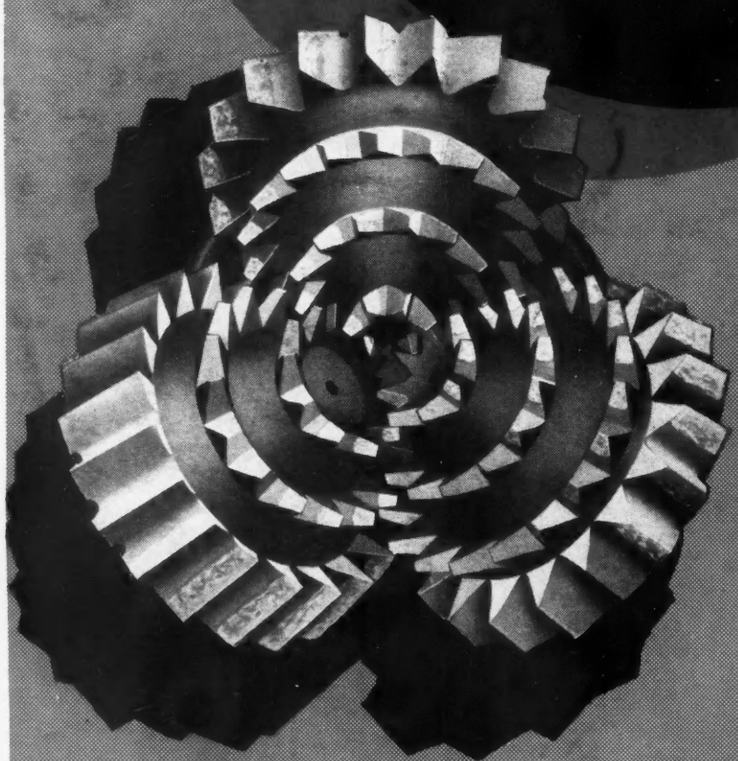
You can spend more time

On Bottom

by using

HUGHES 3-CONE ROCK BITS

–Save Round Trips



3
Points of Rolling Contact

✦

100%
Cutting Surface on Bottom of Hole !

HUGHES TOOL COMPANY

MAIN OFFICE and PLANT—HOUSTON, TEXAS
TULSA, OKLA., OFFICE, 310 THOMPSON BLDG.

BRANCH SERVICE PLANTS
LOS ANGELES, CALIF.—OKLAHOMA CITY, OKLA.
MIDLAND, TEXAS

DEPOT OFFICE
30 ROCKEFELLER PLAZA—NEW YORK CITY, U. S. A.
CABLE ADDRESS, "HUGHESTOOL"

FIELD WAREHOUSES
ADA, OKLA. — HUTCHINSON, KANSAS
SEMINOLE, OKLA. — EUNICE, NEW MEXICO
PAMPA, TEX. — HOMER, LOUISIANA

EUROPEAN REPRESENTATIVE
8 FINSBURY SQ., LONDON, E. C. 2, ENGLAND